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SELECTION

IN

SEED GROWING,

COMPRISING

PAPERS READ BEFORE THE SEEDSMEN'S SESSION OF THE WORLD'S AUXILIARY HORTICULTURAL CONGRESS, CHICAGO, AUGUST 16, 1893.

WITH DISCUSSION ON SAME BY WILLIAM MEGGAT, OF CONNECTICUT; T. W. WOOD, OF VIRGINIA; PROF. L. H. BAILEY, OF NEW YORK, AND OTHERS.

THE SEEDSMAN'S TRIAL GROUNDS,

BY W. ATLEE BURPEE,

TO WHICH ARE APPENDED SEVERAL NEWSPAPER ARTICLES ON

"MODERN METHODS OF THE SEED TRADE,"
"SEED GROWING AT FORDHOOK FARM."

PUBLISHED BY
W. ATLEE BURPEE & CO.,
PHILADELPHIA, PA.
1896.

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PUBLISHERS' PREFACE.

The widespread interest in the development of new and improved varieties of Vegetables, Grains and Flowers, and the importance of the papers read at the World's Auxiliary Horticultural Congress held in Chicago August 17, 1893, suggested the permanent publishing in this pamphlet of those bearing directly upon

SELECTION IN SEED GROWING.

The well-known names of the Authors of these papers, given in the Table of Contents, accompanied as they are in the following pages by stenographic reports of the remarks in introduction and discussion of the essays, taken from the *American Florist* and the *Florists' Exchange*, render unnecessary the writing of any long publishers' preface.

In connection with these essays we also publish a paper on the Seedsman's Trial Grounds, as bearing upon the same subject and illustrating that in seeds "Eternal vigilance is the price of safety."

Our original intention was to publish only these papers and the discussion thereon, but the nominal price (ten cents or free as premium) at which this pamphlet is published, and the fact that it is exclusively offered in connection with our seeds as announced in the FARM ANNUAL FOR 1894, have led us to reprint articles from several papers descriptive of seed growing at FORDHOOK FARM.

Many gardeners and amateurs unable to visit FORDHOOK during the growing season have expressed a desire to know more about modern methods of growing and testing seeds than the crowded pages of our FARM ANNUAL will permit. While to some degree partaking of the nature of an advertisement, we think these articles will prove interesting to thousands of our friends and patrons.

We have also availed ourselves of the space herein at our command to give a more extended notice of our books on Horticultural subjects. The publishing department of our business is conducted for the mutual good of our customers and ourselves, and they are reminded that we always allow a credit of ten cents on every dollar to apply toward the purchase of any books published by us.

W. ATLEE BURPEE & CO.

PHILADELPHIA, *December*, 1893.

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THE IMPORTANCE OF SELECTION IN SEED GROWING.*

Complaints of poor seed come to us from every quarter, and we are asked, "Where is the fault?" We reply, in a great degree the cheat is the man that gets cheated. The principal cause of poor seed is the desire and willingness to buy poor seed, which is only a synonym for cheap seed. Seed growing is one of the most difficult and particular branches of horticulture; in order to secure a stock of good or superior quality of seeds, the utmost attention to selection must be paid. Everything that does not come up to the desired type must be discarded, even though it takes the whole crop, which is not unfrequently the case. This makes seed growing a difficult and expensive business, one requiring the most constant care and attention. Therefore, when the best results in seed growing are attained, they are attended with very great expense, at least four times, in many cases, as much as seed of an ordinary character would cost. Consequently they bring a correspondingly high price in the market. It therefore follows, when dealers whose reputations have become well established make up their price lists, it is but reasonable to suppose they are doing, in way of prices, what every one must do in order to make a success of his business, make prices in proportion to the cost of the article sold. Then they sow good seeds, reap a fair profit, and the consumer is not only satisfied, but is a living advertisement of this seed house.

In opposition to this class, there are to be found dealers who wish to build up a trade, and with it a fortune, by selling cheap seeds. . . . . We do not question the intentions of this class of dealers, but we do know, from practical experience, that it costs more to grow first-class seeds alone than the amount for which they are usually sold, without taking into consideration the cost of selling. We therefore say, if you sow cheap seed, you will reap cheap returns—a crop of disappointment rather than one of pleasure and profit.

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* Extract from an article by C. L. ALLEN in THE PRACTICAL FARMER, September 16, 1893, entitled, "AS WE SOW, SO SHALL WE REAP," to which he gives the subtitle, "Why Good Seed Cannot be Sold at Low Prices."

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In a country so vast and varied as ours, where the setting sun of the East is the rising sun of the West; where in the North there is rarely a month without a frost and at the South rarely a month with one; where the soil in one locality is the most productive, in another the reverse, and this same, too, in close proximity—the seedsman has difficulties to contend with that are entirely unknown in any other country. He must have a knowledge of selection sufficient to enable him to choose from every section of the country such types as are best adapted to its various conditions of climate and soil.—From the essay by C. L. ALLEN, *of New York, page 26 of this book.*

From THE AMERICAN FLORIST, *Chicago, August 17, 1893.*

THE HORTICULTURAL CONGRESS.

THE Horticultural Congress of the World's Columbian Exposition at Chicago convened in the Memorial Art Palace on Michigan Avenue, on Wednesday morning, August 16, as per published programme. There was a large attendance and much interest was manifested.

President Bonney, of the World's Congress Auxiliary, welcomed the visitors in the following words :—

"FRIENDS of the SEED, the FLOWER, the FRUIT; fair TRINITY OF POTENCY AND BEAUTY AND USE: The fairest conception of human existence is of life in a garden, with its exquisite beauty and peace, and from which culture and care have banished every hurtful thing. Among the pictures in the temple of my own memory there is none brighter than that of the garden near the family mansion, in which my mother gathered roses and violets and the early fruits.

"The loveliest symbols of thought and aspiration of sentiment and affection are flowers. There is no more deep and subtle mystery than that which conceals plant and shrub and tree in the seemingly simple structure of a seed.

"There is no more charming art and occupation than the cultivation of flowers and fruit-bearing trees. There is no calling more innocent and conducive to human welfare than that of the horticulturist. The improvement and beautifying of public parks and grounds depend chiefly upon the gardener's art. The protection of fruit crops, involving vast pecuniary interests and the best part of the food supply of great numbers of people, is almost wholly dependent upon the studies, the experiments, and practical wisdom of those whom this Congress on Horticulture represents.

"The trade and commerce in seeds, fruits, flowers, and nursery products is of such magnitude and importance that it is justly regarded as one of the greatest business interests of the world. It is therefore most appropriate that arrangements have been made for a Congress on Horticulture among the many congresses of 1893.

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"This Congress has been organized by a Committee of Organization, of which Mr. J. C. Vaughan is chairman, assisted by a Committee of Co-operation of the American Seed Trade Association, of which Mr. W. Atlee Burpee is chairman, and a Committee of Co-operation of the Society of American Florists, of which Mr. E. G. Hill is chairman. Upon the nomination of these committees Mr. P. J. Berckmans has been appointed the presiding officer of the opening session of this Congress.

"A glance at the programme prepared shows that it is properly representative of the various interests involved. France, Germany, Denmark, and many American States are represented by appropriate subjects and contributors. Other States and countries will doubtless take part in the discussion. In behalf of the World's Congress Auxiliary of the World's Columbian Exposition I welcome you to this Congress."

From THE FLORIST'S EXCHANGE, *New York, August 26, 1893.*

SEEDSMEN'S SESSION.

THIS session, which was presided over by Mr. W. Atlee Burpee, of Philadelphia, president-elect of the American Seed Trade Association, was held on Thursday forenoon, August 17, 1893. There was a large and enthusiastic attendance, and the papers read were listened to with the closest attention. Mr. Burpee, in opening the proceedings of the day, said:—

After the opening of the Horticultural Congress yesterday by Mr. Bonney, the addresses of welcome by Mr. Vaughan and Mr. Berckmans, it only remains for the chairman of the Seedsmen's session to introduce the speakers whose names you will find on the programme. This Congress is certainly very well timed; while not so well attended, owing to the counter attractions, the papers read will be of high interest and have wide influence after their publication. Horticulture, for its proper advancement and full development, seems necessarily to be as international in its character as are the finances of the world. The advancement of American horticulture and of American seed growing, while it has been great, has ever looked to Europe for much of its knowledge, for many of its improved types, and must continue to do so, just as Europe will look to America and each nation to the other for the special advantages of soil or intelligence which each nation may offer.

Of all the European nations to which America is indebted for advancement in progressive seed growing, none stands higher than France, and in all France there is one name which stands pre-eminent, the name of a man whose signal services to the advancement of horticulture have been recognized by the French Government with the distinction of Chevalier of the Legion of Honor. That gentleman is with us to-day. While a citizen of France, yet, from his wide achievements in horticulture, we can call him a citizen of the world, and the advancement and impetus which he has given to the improvement of many varieties of vegetables and flowers grown from seed cannot be confined to only one country, but must be world-wide in its beneficent effect. I have the pleasure of introducing to you one whom we all delight to honor, Mr. Henri L. de Vilmorin, of Paris. [Applause.]

PEDIGREE OR GRADE RACES IN HORTICULTURE.

BY HENRI L. DE VILMORIN, PARIS.

[READ BEFORE THE SEEDSMEN'S SESSION OF THE WORLD'S FAIR HORTICULTURAL CONGRESS, CHICAGO, AUGUST 17, 1893.

THE subject on which I intend to address you may seem at first sight to be a rather special and limited one. I trust, however, that upon consideration you will see with me that it is one of great importance and of the deepest interest. I claim for it a constant and all-powerful action in the life of garden plants when we are seeking the most improved races.

It is a well-established fact that the life-work of plants is to make the mineral wealth of the earth fitted for the use of animals and of man. Now it is clear that the plant's work can be done well or ill according to its more or less perfect fitness to its functions. It is, moreover, within the power of man to consider, and to some extent control, the efficiency of plants as regards their work, to select and to increase the best only, and by continued selection to develop more and more the good qualities of each kind. In this way man raises races and varieties of plants which do their work best and quickest. Heredity is the lever by which the results of the study and care and perseverance of the raiser are fixed, so to say, into the most valuable of the plants grown for man's use or delight. We have no more powerful means of improvement of vegetable forms. All the care, food, and protection given to plants may make them larger and finer, but only selection among many of the same kind, with the help of heredity, can fashion an enduring race of plants with special good qualities for our farms, gardens, or orchards. Chance seeding may yield some very good finds, as sometimes a good hit is made by shooting at random. But no good marksman will, even after the luckiest of chance shots, dispense with the use of his eyes and judgment for the rest of the day. In the same way no experienced raiser will trust to chance

in the choice of the seed from which he expects some precious results. He will gather it from one plant seen among many, and will have good reasons to show for his choice.

It is plain that selection was not at all times done with such thought and skill as it is now: but ever since plants have been cultivated an evident improvement has been going on for our benefit, and fixed and valuable races of field plants, vegetables, flowers, and fruits were known to the oldest nations and are mentioned by the oldest writers. Since the settlement of America a new field was opened for good work, which yielded a splendid crop of honor and profit to American as well as to European cultivators, and through them to their respective countries.

Let any one who doubts the high value of selection look at our fine races of cabbages, kales, cauliflowers, kohlrabi, and rutabaga, and compare them with the wild cabbage of our western shores of Europe; let him compare our fine garden beets and our mangels to the wild beet of the Mediterranean shores; let him compare the tomatoes and potatoes of to-day with the wild South American plants,—and he will see proof that only human thought and skill have brought about such wonderful changes—many of them in our own day, many, on the other hand, some hundreds of years in existence. In the tomato and potato we have two distinct examples of garden races, viz., (1) those which are increased from seeds, as the tomato, and (2) those which are increased by division of a plant, as the potato.

Even where we divide the plant itself heredity is of some importance, as new varieties can be raised from seed only, and it is by no means indifferent to gather seeds meant for the purpose from one variety of potato or from another. Distinct groups of races are seen in the potato, as the rose tribe, to which the Early Rose, Late Rose, and many more can be referred. Just in the same way a nurseryman who sows pear pips in search of new varieties will take good care to take them from some old sort, the parentage of which gives good hope of success. It follows, then, that even where increase by division is the rule the knowledge of the quality and history of a plant may be of essential importance.

What Heredity is.

Where selection is done with skill and care the improvement of many kinds of cultivated plants effected by its means is invaluable. The large pansies, the huge hybrid gladioli, the large-flowered cannas, were all brought from the state of small flowers to their present excellence in our own day by careful observers, who, watching every varia-

tion and keeping an exact record of the descent of all their plants, turn to the best account the wonderful action of heredity.

That plants are endowed with the power of changing to some extent under altered and varying conditions no one will deny who knows even a little natural history. Such changes will occur in wild nature as well as under cultivation, and by the action of heredity will be transmitted more or less faithfully to the next generation.

But an all-important fact must be recognized and remembered. It is that in the wild state only such variations have a chance of enduring as give the plant in which they occur some advantage in its life. Many variations appear every year which soon disappear, because they are a loss, not a gain, to the plant. Suppose in the wild state a potato plant with short stems and late-sprouting tubers in a mass at the base of the stem. Such a plant would not have any chance against rank growing and early shooting varieties, and it would soon perish. Still, some such characters belong to some of our best potatoes. This is owing to the action of man, who throws his power into the balance when cultivating plants which are useful or pleasant to him, and who gives the weakest plant, if it is for some reason a favorite with him, all the advantage he can to make it thrive and answer his purpose. Most of the variations induced in our garden plants are not in favor of the plant if in a "free fight" with its kind in nature. All our improved roots, as carrots, turnips, beets, make an early and succulent growth for our own benefit, but not at all for their own good. If left to their fate to struggle with their own wild forms they would soon have to take a "back seat" and very likely soon perish. It follows, then, that varieties improved from man's point of view must receive kind treatment and richer food than wild forms of the same plant. The cultivated plant, like the domesticated animal, yields in a measure its powers of self-defense to adapt itself to our service. Man must in return provide for its safety and nourishment. In the improvement of plants the action of man, much like influences which act on plants in the wild state, only brings about slow and gradual changes, often scarcely noticeable at first. But if the efforts toward the desired end be kept on steadily the changes will soon become greater and greater, and the last stages of the improvement will become much more rapid than the first ones.

I may relate here, in a few words, an unpublished experiment which I have been conducting for more than twenty years, from 1872 to the present year. It has consisted in cultivating one of our parsley-worts (Anthriscus sylvestris), a European weed, in order to change its slender

and much forked roots into fleshy, straight, and clean roots, say like those of the parsnip. Among the first batch of roots raised from wild seeds a dozen were selected with a tendency in their roots to larger and straighter bodies. Each root was planted separately and its seed harvested separately. Of the dozen lots obtained eight or nine were discarded at once and roots were selected only in such lots as exhibited some trace of variation. Again, a dozen roots or so were chosen, a drawing made of each root, which was afterwards planted separately. I have sketches of all the roots selected, so that it is possible to follow all the stages of variation of each plant living at this day. For the first ten years the changes were slight, but now they are more and more marked with every generation, and in some of the lots the straight and smooth roots are the most numerous.

My object was not to create a new vegetable, as the roots of Anthriscus sylvestris have such a strong taste of camphor as to be quite uneatable, but simply to show that careful and continuous selection could transform a wild plant in years that do not equal a quarter of the span of many human lives. Like results have been shown by my grandfather with the wild carrot, only its results were open to controversy as to possible crosses between garden varieties and the wild strain. No such objection can be raised in the case of my wood parsley-wort.

How it Works.

Althought heredity is an ever-present and active agent in the transmission of qualities and characteristics in organized beings, its mode of action is not so simple as at a first glance it might seem to be. That like breeds like is a commonly admitted fact, but there like must be taken in a rather broad sense, and the fact that some differences may occur between the parent and the offspring is at the bottom of all improvement of plants by selection.

A being born from one or two of the same kind will be like his parent or parents. But if the parents, although of one kind, were not exactly like one another, how will the descendant look? Will it take after the one or after the other, or blend the features of both? And again, if each of the parents comes from two different ancestors, which of the four will take the lead in the form and character of the new being?

The network of lines of attraction which would induce a living organism, plant, or animal to be like every one of its ancestors can scarcely be unraveled. Still, the consideration of the various influences acting on an incipient organism can be pretty accurately summed up in direct heredity, which tends to make the new plant or animal to re-

semble its immediate progenitors, and atavism, which induces it to be like the mass of its removed ancestors. I omit for the present the idiosyncrasy, which is the tendency in the new plant to combine the inherited characteristics in some special manner adapted to its own particular wants. If the parent was like its progenitors, then all the influences work the same way, and there is every chance of perfect fixity in the series of beings born in succession. But if the progenitors for one or more generations have swerved from the characteristics of the ancestors, heredity and atavism will come into conflict, and the outcome cannot be predicted surely.

Some hints on probabilities may be had from an experiment conducted by my father on two varieties of the Lupinus hirsutus, the one with blue and the other with pink flowers. The conditions were in this case very well adapted to the study of the action of heredity, the flowers being in the lupine not only hermaphrodite, but also cleistogamous, so that a seed is the product of only one bloom of one plant. Two lots of seeds were sown to begin with, some of the blue and some of the pink strain. Most plants turned out true; still, a few with pink flowers were found in the lot of blue, and conversely some blue among the pink ones.

In the following year seeds of the true plants were sown again, and along with them seeds of the "rogues" found in each lot. In the latter the greater proportion of plants followed the color of the parent plant, but a great many more showed the alternative color than was the case in the original lots. Seed from blue and pink flowered plants of the third generation were sown again, every possible combination in the relations of the ancestors as to color and distance being tried as much as possible and the number of blue and pink flowered plants being carefully noted in each case, and the experiment was carried on for several years. Though no exact rules can be arrived at from experiments with living things, from the tabulated results of the experiment the following inferences can be drawn:—

1. The tendency to resemble its parents is generally the strongest in any plant.

2. But it is notably impaired if coming into conflict with the tendency to resemble the bulk of the ancestors.

3. This latter tendency (called atavism) is constant, though not very strong, and scarcely becomes impaired by a series of generations passing by without a reversion to the ancestral type having taken place.

4. On the contrary, the tendency to resemble a near progenitor (two or three generations only distant) very soon becomes obliterated

if the said progenitor be different from the bulk of the ancestors. From this it will be seen that choice new races can be raised quickest and with the smallest amount of labor where all needless conflict in the hereditary powers is avoided.

How the Action of Heredity can Best be Turned to Account.

But it may be rightly remarked here that it must be shown how variations can be obtained before we are shown how they can be made permanent.

It is admitted by all observers that plants, being immovably fixed in the ground by their roots, and consequently prevented from seeking favorable and from avoiding untoward circumstances, are endowed by way of compensation with the power to adapt themselves to some extent to different conditions as to soil and climate. The manner in which plants so adapt themselves is most admirable, but it is not here the place nor the time to consider it. Suffice it to say that the changes in the size, position, and anatomy of their various organs appear to be called up by rather than produced directly by the changed conditions. The important point in the present case is that variations in the special characteristics of a cultivated race may and do occur occasionally, and that such variations can be made permanent and still magnified by the process of selection. To wait for them to appear among seedlings is the simplest and most ordinary process. But their appearance can be hastened and made more probable by the selection of seeds from a plant showing already some trace of variation, or by means of a cross with some other variety of the same species. As soon as a distinct variation has made its appearance the work of selection begins. The essential thing is to secure a deviation from the old type of the plant under experiment. It matters little whether such deviation takes place in the desired direction or not. Some authors even advise the experimenter to look for any change at the first stage, and at the next one for the greatest possible deviation from the first change in any direction except a reversion to the old type. This may be useful as far as the appearance of new forms is concerned, but if adhered to too long it might make the fixation of the new forms rather difficult and slow by breeding continuity out of the new race.

Whatever the cause of the original variation was, action of the plant's own tendency to vary, or some external cause, or a cross of pollen, the next thing to be done is to make the variation permanent by selection. This is sometimes very easy, the new form becoming at once perfectly true and fixed. A case in point occurred several years ago in my trial

grounds at Verrieres. One plant of Clarkia elegans with pure white double flowers was discovered among a number of the same species with double purple flowers. It was singled out of the seed sown the next year, when every plant raised gave only double white blooms, and it has never since been known to give any but pure white flowers. If such cases were of common occurrence they would make the task of the breeder of new varieties a very easy one. Unfortunately, they are very rare exceptions, and the tendency of new seedling forms is rather to revert frequently and rapidly to the original type. Great attention and vigilance must be exerted to counterbalance this tendency to reversion. The best and most useful plan is not to mix together the seeds of the selected plants in case several were singled out, but to sow the seed of each separately, as the several plants selected may be endowed in a very unequal degree with the power of transmitting their own characteristics to their progeny. Now, the principal object and the principal effect of selection, if well conducted, is to effect a complete transmission of the qualities we seek of any given race. Its aim must be, in consequence, to eliminate any plant which is not fit to reproduce itself "true."

It is often observed that in such cases, when the seeds of several plants selected in the same batch of seedlings are sown side by side and separately, the one will come up true with only a very few or no "rogues" at all, while others will give a very medley of plants. If further selection be made only from the lot that came up true, the new variety may be considered as already fixed; whereas many years of cultivation and "roguing" may be required to bring it to anything like purity if progenitors be taken from the lots in which numerous variations occurred. Fixity of character is of great importance to garden and field plants grown from seed, and the tendency to fixity should be inbred in plants just as the tendency to earliness or to hardiness. The power of transmitting their own qualities to their progeny is just as hereditary as any other qualification, and no effort should be spared to make it one of the points of a new race. Breeding from single progenitors appears, so far, to be the safest and shortest way to the proposed end.

Cross-breeding greatly increases the chance of wide variation, but it makes the task of fixation more difficult. It, however, gives the raiser the only means in his possession to unite in one the qualities of two different plants while discarding their weak points. All the different qualities of the two parents seem to unite in the most varied combinations in the cross-bred products. In this way plants are often found

which inherit most of the good points of both parents, while some others sum up the defects of both. This I repeatedly observed in rearing cross-bred wheats. An occurrence not unfrequently observed in cross-bred plants is that some character belonging to one of the parents is magnified in the progeny. For an instance, Mr. Charles Naudin observed in crossing daturas that the cross of a slightly prickly variety with another kind that had smooth stems resulted in the raising of a decidedly prickly hybrid.

In framing the character of the progeny the action of each parent is often very unequal, according to the power of each in transmitting its characters. The one that is better endowed in that respect stamps its features more firmly on the cross bred plant. Discussions have arisen on the influence of the male and of the female progenitor on a cross. I believe that the stronger organism of the two, the one rather which is better endowed with the power to transmit its characters, will predominate in the progeny whether it comes from the male or the female parent.

One trait that makes the fixation of cross-bred plants difficult is in some characters of both parents breaking out in different parts of one and the same plant, instead of being, as we could wish, blended together. In cross-bred peas, for instance, which were raised from a white seeded and a green-seeded parent, it often occurs that at the second or third generation pods are produced which contain mixed white and green seeds. In the same manner round and wrinkled seeds are found in the same pod. This is a great difficulty and an almost sure sign of further variation, as a plant showing such breaks cannot be depended upon to give rise to a uniform progeny. In many similar instances recorded in my books of experiments the green peas gave plants with white seeds and the white ones with green. You can scarcely expect a plant which is not constant in its own parts to be constant in its progeny.

The unity in character of any single plant is the main factor in the work of pedigree or grade breeding, and I wish to lay especial stress on that point, which I think of paramount importance. The consideration of the qualities or defects of a plant taken as a whole, not of minor parts, should guide the raiser in his work. Of this I am convinced from experience, and I may be permitted to give a few facts in support of my opinion.

The advice is often given in horticultural books to take the seeds from some particular portion of the seed-bearing plant in order to secure a better result. In German stocks, for instance, it is a common belief that the seeds of pods taken from the middle or from the base of

the main stem will give a larger proportion of plants with double flowers than if taken from the top of the same or from side shoots. I many times tested the idea, and it always proved a fallacy. All the pods on a plant give an almost exactly equal proportion of plants with double and single flowers, no matter what part of the plant they may be gathered from.

A real difference is in the percentage of single and double flowers from various plants of the same variety. In this way very wide dif ferences sometimes occur, but not in the case of seeds taken from various parts of the same plant. .I tried an experiment with seeds of Chrysanthemum carinatum gathered on double, single, and semi-double heads, all growing on one plant, and found no difference whatever in the proportion of single and double-flowered plants. In striped verbenas an unequal distribution of the color is often noticed ; some heads are pure white, some of a self-color, and most are marked with colored stripes on white ground. I had seeds taken severally from all and tested alongside one another. The result was the same. All the seeds from one plant, whatever the color of the flower that bore them, gave the same proportion of plain and variegated flowers. No more proof, I think, need be given that selection, which is all-important in the case of seeds from different plants, is of no importance as regards the different parts of any one plant on which seeds may be borne.

No limit can be fixed as to the improvements which may be expected from care, thought, and selection. The gains of the last dozen years may surely be taken as the forerunners of better things. It is clear that no very important additions to our cultivated plants are to be expected now from the discovery of new species, but an unlimited field opens before the raiser of new and improved forms in all our garden flowers and in fruits and vegetables. The recent success of European raisers of new begonias, of hybrid gladioli, and of large-flowered cannas are equaled by the gains of the American raisers of chrysanthemums, of garden beets, and of tomatoes. I may add by way of conclusion that much good may be expected from the more and more frequent exchange of strains between the old and the new world. Such complete changes of soil and of climate frequently give rise to variation, and so, either by subtle changes one cannot see the cause of, or by well considered crosses, American and European varieties of our useful or beautiful plants may give rise in their turn to more numerous and useful variations than would have occurred had these races been confined exclusively to the country of their origin.

SELECTION IN ITS RELATION TO SEED GROWING.

BY C. L. ALLEN, NEW YORK.

[READ BEFORE THE SEEDSMEN'S SESSION OF THE WORLD'S FAIR HORTICULTURAL CONGRESS, CHICAGO.]

SELECTION, from the seedsman's standpoint, means more than a choice of samples, or more even than a preference of types in the various classes of vegetables or flowers, whether it is in regard to shape, size, color, or in its relation to earliness or lateness in development, as may be desired. Neither has it any connection with the popular theory of what is known as "natural selection," "the survival of the fittest," that active principle of evolution which was cradled in the fertile mind of that distinguished philosopher, De Lamarck, and by the late Charles Darwin developed into the "origin of species."

To the seedsman selection is not a cause, but an effect, and in its application to his business it is of vital importance; in fact, it is the foundation upon which the superstructure of business success is completed. In the development of a type, selection is the principal agent employed, but doubly important is its office in preserving a type after it is secured. There are two separate and distinct principles in selection, and the two are antagonistic; they are both methodical, but for entirely different purposes. In the one instance we select with a view of the greatest possible increase in seed production, and in the other just the opposite. In our cereals selections are made to produce the greatest amount of seed with the least possible amount of straw. To that end, in the best wheat-growing sections, the longest and best filled heads are carefully selected; and those, too, in which the grains are the heaviest for seed purposes. The seed thus saved is given every possible aid to reproduction by growing it on soil best adapted to its development; by giving each plant sufficient room to grow strong, rather than tall; and by furnishing plant food proportionate to its

necessities. At the proper time, if the same careful selection is again made and the same care in cultivation given, there will result another marked improvement, both in size and productiveness of the grain. This operation oft repeated will establish a type superior to that from which the first selection was made. To preserve that type the same care must be given that was necessary to produce it.

The same rule holds good in the selection of Indian corn, an important work that is generally overlooked. It is the common practice to select the best ears for seed at the time of husking, which is a step in the right direction ; yet this practice is attended with many disadvantages, and does not, as a rule, accomplish the purpose intended. In this method the largest ears are selected, of which there is usually but one ear on a stalk ; besides, there is no certainty about selecting such ears as ripen at the same time, which is a matter of great importance. It is possible for a weak plant to produce a large ear, and it is very common for a plant of bad habit to do so. It is but natural to suppose that the grains of stunted and sickly corn, even though the ears may attain a large size, necessarily partake of the weak constitution of the plant that produced them, and that to reproduce from such would only be to encourage bad habits. For this reason ears should be selected before the stalks are cut, choosing those on which there are two well-formed ears on the stalk, which should be of low growth and well furnished with leaves, and the ears set near to the ground. The whole plant should, by the length and breadth of the leaves and the vigor of the stalk, indicate perfect health. Earliness should always be combined with productiveness ; therefore, the first ears to ripen, when all other conditions are favorable, are the ones to select in the line of improvement. All should be gathered at the same time, in order that there may be uniformity in ripening, united with earliness, which is of the greatest importance in developing a variety.

This may suffice to show the method of selection, where the object is to produce the greatest amount of perfectly developed grains or seeds from a given acreage, to be employed as food. With this object in view it is needless to state that nearly all seeds will reproduce themselves more freely if sown as quickly as possible after maturity. This is shown plainly by the way weeds reproduce themselves, the seeds of which are sown as soon as ripened. But in selection for vegetables, where seeds are only used to reproduce the plant, the opposite course must be pursued, and forms must be chosen that produce as little seed as possible. This is particularly noticeable with the Eng-

lish-grown cucumbers, which are, from nature's standpoint, degenerate forms, as they do not reproduce themselves except by artificial fertilization. This comes from their having been grown for a long series of years under unnatural conditions.

All species of the natural order, Cucurbitaceæ, to which the cucumber belongs, finds a congenial home in warm climates and on dry soils. The farther they are removed from these conditions the less seed they will produce, and the vitality of which will be proportionately lower. At the same time nature is always true to her first principle, self-pre servation. To that end greater protection is given to the germs of future generations.

The outer covering of seeds is for their preservation or protection while in the infant state, and at maturity these coverings dry up or decay and disappear. These coverings are adapted by nature to the plant's necessities ; if but little protection is required, only little will be given. With all vine seeds, the less seed there is produced the greater is its value for the production of the crop, as the flesh is the part consumed ; and it invariably follows that the greater amount of the one, the less there will be of the other. Therefore, the best fruits of the vine family are those with the least or lowest reproductive qualities. Gardeners with keen observation note the fact that the older melon, cucumber, and squash seeds, are—without having lost their germinating power—the better, as the proportion of flesh to the seed is greater, and the vines are more productive of fruit and less inclined to throw out branches. The older the seed the lower is its vitality, and the greater is nature's effort to preserve it. As the careful mother doubly protects the feeble child against cold, so Mother Nature protects the seeds of low vitality with extra covering. The melon has more flesh when grown from old seed, because of its low vitality.

The same is notably true with the egg plant, which is a native of North Africa and the East Indies. In these warm climates the fruit grows from four to five inches in diameter, and abounds with seed, filling the flesh nearly to the rind. As its cultivation extends northward the fruit increases in size, while the amount of seed diminishes. Thus, Nature guards her productions by enlarging the pericarp or fruit, in order that the seeds may be better protected against cold, which would destroy their vitality. The variety known as the New York Improved Purple, grown from seeds raised as far north as New York City, yield a crop, both as regards size and quantity, far in excess of the plants grown from seeds produced in the Southern States. The

reason for this is obvious. Nature, being a strict economist, does not work in the interest either of the seedsman or the market gardener. Her object and sole aim is to preserve and perpetuate the species ; and when the plant has furnished the proper amount of seed nothing further is required of it. If a plant grown in a temperate climate produces in a single fruit only one-fourth the quantity of seeds which it usually yields in a warm climate, it follows that four times the number of fruits must be produced to accomplish the desired result. And this is what the egg-plant does at the North, when raised from Northern-grown seed. As before stated, plants from Northern-grown seed produce more fruit but less seed ; so, too, is the seed less vigorous. Long Island-grown seed will rarely test above sixty in germinating, when fresh ; besides, nearly all Northern-grown seeds of this variety of egg plant are small and shrunken, while that grown at the South is large and plump, and will invariable give a more satisfactory test of germination. As is the case with many other kinds of vegetables, the conditions that are favorable for the production of the fruit are unfavorable for the production of good samples of seed and a yield satisfactory to the grower.

A more familiar illustration of this principle may be seen in the history of the development of the cabbage. Changes in form, through climatic influences, are shown to have been greater in this than with any other vegetable. In a wild state the parent of our cultivated forms of cabbage has but few leaves, which are loosely arranged, but all that are necessary to protect the germ of the coming season's growth, which is to produce seed for the perpetuation of the species. When taken to a colder climate more protection becomes necessary. This is furnished by additional leaves, which are of a finer texture and more compactly arranged. The result of this care is the solid heads of our present varieties of cabbages. From two or three distinct types introduced from Holland early in this century a large number of varieties, more or less distinct, have been produced wholly by careful, and, in many instances, systematic selection. To more clearly illustrate this principle let us note some of the points in the development of forms, where the cabbage is grown to the greatest perfection. Long Island is probably the most congenial home of the cabbage to be found in this or any other country. Nowhere else is it so generally grown or of a better quality. And here is where the greatest number of truly distinct varieties have originated. There is probably a greater variety of soil to be found in close proximity here than in any other part of our country. On the one side is a heavy but friable loam, capable of pro-

ducing enormous crops. On the other side it is of a light, sandy character, with but little recuperative strength. Intermediate is, in sections, a turfy and sandy loam, and beneath all is a gravelly subsoil, a condition best suited for cabbages.

In most countries there are certain districts and some particular farms which are famous for the production of some special crop and where the same is extensively cultivated. In such localities there are usually to be found some men who are leaders in their principal industry ; they are regarded as authorities and their advice is taken on all matters that pertain to their calling. This is the case on Long Island in regard to cabbage, where certain farmers possessing a remarkable degree of intelligence, and who are close observers and thinkers as well as workers, have made the growing of cabbage a speciality. These men have made selection as a choice in regard to form and habit a study. They have chosen for a purpose, either as regards earliness or lateness, or for the development of a desired form. Persistent labor and watchful care in this direction have been the means of producing the best strains or varieties of cabbage in cultivation.

While variations of climate produce wonderful changes in vegetable forms, it is a well-established fact that any vegetable grown in a given soil will assume a very different form when grown on either a heavier or a lighter one. This has been shown in a remarkable degree with the cabbage. A given variety grown for a long number of years on a heavy soil, with a liberal supply of plant food, proper care in growing the plants and in transplanting them, and constant cultivation until the crop is matured, will develop a type remarkable for size and vigor, with excellent keeping qualities, and be what is known as a Late Flat Dutch or Drumhead cabbage. On the other hand, take the same stock seed, grow it on a light sandy soil, under the same climatic influences, with the same care in cultivation, always selecting with a view to earliness and solidity and the result will be in the same number of years a variety of the same general form but of smaller size and very much earlier. Again, a soil intermediate in character, from the same stock, during the same period, with the same care in selection, will give a variety intermediate in character as well as in period of growth. Under such conditions have been produced the several varieties introduced from Long Island.

It is an established principle in agriculture that a sandy soil is favorable for an early growth, and a heavy soil for a continuous growth. Early and late, large and small, varieties are not to be expected from the same soil and under the same conditions of growth, both natural

and artificial. It must of necessity take a longer time to grow a head of cabbage weighing twenty pounds than one half the size. I have thus far spoken of the development of the cabbage by selection under natural conditions, but there are other methods employed by the specialists. These are of an artificial character and have been material helps in selection. When these specialists harvest their stock seed they examine each plant carefully before cutting it, and if the seed is of large size it is rejected, because they hold that such seeds will make leaves instead of heads. Besides that, these men will not use seed until it is at least three years old ; for the same reason they will not use large seed. This statement corroborates my assertion "that the conditions favorable for the production of the fruit are unfavorable for the production of a good sample of seed." I may, however, add that a handsome sample is not always a good sample, always excepting instances, as in the cereals, where the seed is the part consumed.

In the whole list of garden vegetables there is none so susceptible to improvement as the tomato ; none better pays good attention ; none shows neglect more quickly, both in quantity and quality of fruit. It is, moreover, capable, by careful selection, of the highest development, and will as quickly deteriorate if the same care in selection that was given to produce a variety is not continually employed to preserve it. It is generally supposed that the varieties have a natural tendency to deteriorate, which makes it necessary to be constantly on the watch for new varieties, which have their parentage in cross-fertilization and are developed by selection. This theory is both absolutely true and wholly false, although this statement may seem paradoxical. I have endeavored to show the marked effect upon vegetable growth of climatic influences, together with the character of the soil. But the tomato is more sensitive to change than any other vegetable with which I am acquainted, and it is more erratic, too, than any other. On my own grounds I have had the Ignotum, since its first introduction, and with me it is the most perfect and most desirable of any of the vast number of varieties. It is perfectly smooth, of good size, ripens evenly and well up to the stem, the substance is more solid than that of most others and is perfectly tender. An intelligent grower in this section has given it special attention for seed purposes, and it continues to grow in favor. From the same seed bed for the past two seasons plants were taken a distance of ten miles and grown on nearly the same character of soil, and under precisely the same conditions of climate, while the cultivation in the two sections was alike of the highest order, but here this variety was a total failure ; the fruit was deeply ribbed, irregular

in shape, ripened irregularly, and the vines grew in all manner of ways, produced but little fruit, and this was worthless. Mr. Hallock, the successful grower, states that he has heard similar reports from other sections.

On the other hand, during the past two years I have visited two gardens, at least one hundred and fifty miles apart, where since the Trophy was first introduced no other variety has been grown, and during the twenty-five years this variety has constantly grown in favor. The fruits are more even in size and shape; they ripen up to the stem perfectly, and, what is more important, they ripen to the center and produce but little seed. A fault with this tomato when first introduced was that it did not ripen to the center, which was invariably a little hard.

These two instances are related to justify my assertion that there is and is not a natural tendency toward deterioration. What they may or may not be depends wholly upon circumstances. This theory being established, what is the lesson? Plainly, that, especially for seed purposes, the tomato should never be grown excepting under conditions where, with good cultivation, it will remain true to type. That there is a great difference in varieties in this respect cannot be questioned. For instance, where the Ignotum signally failed the Trophy and the Favorite were both satisfactory. This is one of the difficulties the seedsman has to encounter, and for which there is no preventive. But there is one thing he does or should know—viz., the price usually paid the grower is not in harmony with the principle of selection, but rather the actual cause of deterioration. Difficult as the problem may be of solution, it is evident that the best directed efforts are not always crowned with success, and that the best possible selection for a given locality may be disappointing in another.

Few vegetables show so great a change in their eating qualities as our sweet corn. There are, relatively, but few localities where it reaches its limit of perfection. Selection of place, to secure the best, is quite as important as to select with the view of an improved type. It is poorest when grown on a light, sandy soil, and best when grown in a moderately heavy loam and disintegrated shale. To show how the soil affects quality, take an ear grown in Connecticut, its congenial home, and plant one-third of its grain on the sandy soil of Long Island, one-third on the heavy soil, and the remainder where it grew, and there will be three distinct qualities. The same grown but a few years in the southern sections of our country develops a distinct and worthless type as a vegetable. What is true of the vegetables mentioned is

true of all others, which shows the importance of selection in all its phases.

It has often been demonstrated that when any given type has been developed by selection, either rapidly or slowly, under favorable conditions of soil and climate, it will as rapidly revert when grown under reversed conditions. It is also true that any form that will materially revert when grown under changed conditions for a few years will proportionately change in one year. This will, in a measure, account for the deterioration of varieties where the stock seed has been grown under different conditions from where the type originated. In most instances one year's growth will not materially change a type, but in all cases where a type is to be preserved it requires the same care in selection and cultivation and other conditions under which it originated.

Many persons maintain that a renewal or change of seeds is absolutely necessary. This may or may not be so. All depends upon circumstances. In a locality where a certain type can easily be kept up and improved by selection a change of seed is not only unnecessary, but unwise, and the only safe course to pursue is to procure stocks from a locality where it reaches the greatest perfection — it matters not whether it be in our own State, country, or continent.

In a country so vast and varied as ours, where the setting sun of the East is the rising sun of the West ; where in the North there is rarely a month without a frost and at the South rarely a month with one ; where the soil in one locality is the most productive, in another the reverse, and this same, too, in close proximity — the seedsman has difficulties to contend with that are entirely unknown in any other country. He must have a knowledge of selection sufficient to enable him to choose from every section of country such types as are best adapted to its various conditions of climate and soil. This is no easy task when, as demonstrated, varieties show such marked changes, when grown but a few miles apart, apparently with the same climatic influences, and where there is but little difference in the character of the soil. The aim of the seedsman is to procure the best quality at the least possible cost, but in their efforts competition is an antagonistic force that is quite apt to counteract the best motives.

SEED GROWING IN DENMARK.

BY J. PEDERSEN-BJERGAARD, OF COPENHAGEN.

[PORTIONS OF A PAPER READ BEFORE THE SEEDSMEN'S SESSION OF THE WORLD'S HORTICULTURAL CONGRESS, CHICAGO, AUGUST 17, 1893.]

THE time at my disposal will only allow me to touch upon some of the best ascertained facts and such methods of investigation and experiment as have led to progress and improvement in various ways, and which, I hope, will be found of practical value to the horticultural and agricultural world in general.

Denmark being preëminently an agricultural country, the growing of grain has all through her history been one of the most important pursuits of her population. Until dairy farming commenced to attain its present high development, a very great proportion of the grain grown was carried off from the farm, and its exportation to foreign countries formed the chief source of the national revenue. Now the greater part of the production of grain is consumed on the farm for stock feeding and for transformation into the more valuable dairy products, while the fertility of the soil is being kept up or even improved by means of the greatly enlarged and well fed stocks of cattle and other domestic animals.

But the importance of the best possible grain-crops has not diminished, but rather increased, by the said radical change in the system of farming. Any attempt at improvement of the cereals or improved methods of utilizing them has, therefore, found a hearty support from the proper authorities and been readily appreciated by practical agriculturists. Private endeavors in this direction had been made for some time, and new varieties of different cereals had to some extent been introduced, but more extensive, thorough, and well-planned efforts for improving the cereal products may be dated from 1880, when the Royal Danish Agricultural Society (the Danish name of which is Det kongelige danske Landhus-holdnings selskab) appointed a committee for instituting cultural and malting experiments in order to solve

a great number of questions relating to the most profitable production of malt-barley. Two years later, in 1882, a similar committee was appointed by the said Society with the view of planning and conducting comparative field experiments, and grinding and baking tests, with a number of critically chosen varieties of wheat. At the start, the wheat committee had two objects in view: First, to point out the varieties of wheat which, with the greatest possible productiveness, might combine the best possible general quality and hardiness to the frosts of winter; and, secondly, to throw light upon the influence of the conditions relating to the cultivation of the growing crop in the direction of promoting or diminishing the desired quality.

Oats occupy by far the largest area of the cereal crops in Denmark, almost nine times as large as the wheat or the malt-barley crop, and nearly twice as large as the crop of other barley or of rye. The crop being of so comparatively great importance, untiring efforts have been made for a number of years to discover new and better varieties or improve older, good sorts, by good cultivation and strict selection of stock grain. Almost every variety of European and American origin has been tested. Very prominent for large yield both of straw and grain of excellent quality are two well-developed varieties: "*Grenaa*" and "*Island*" oats, both of Danish origin. "*Provsti*" oats of good strains, "*Beseler*" "*Bestehorn*," and "*Heine*" oats have all proved themselves very productive.

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As dairy-farming more and more became the chief agricultural source of revenue in Denmark, it soon became evident that successful dairy-farming could not be carried on without a liberal feeding with roots during the winter. Prominent practical agriculturists and the agricultural press have used every opportunity to convince the masses of less wide-awake farmers of the well-ascertained fact that by no other means, by the growing of no other kind of crop, can such large quantities of just the right kind of nourishment for milch cows or for rearing pigs and fattening live stock be produced. The areas of land devoted to the growing of root crops have, in consequence of this sound teaching and the conspicuous good results attained by its practice, year by year increased at a considerable rate.

Originally, root seeds were exclusively imported from foreign countries, but soon a movement was set about by private parties, liberally supported by patriotic institutions, for home production of seed of the most popular varieties of roots, and for ascertaining which were the most valuable for different soils, and how they could be developed

to greater perfection with regard to uniformity of type and habit, greater productiveness, etc. Gradually some of the most popular varieties of mangolds, especially, have been considerably improved, by breeding out the tendency to "run to seed," "long necks," and "side roots," etc.

A very important question arose a few years ago, namely: as to the methods to pursue in order to produce roots with *a higher percentage of dry substance*, and consequently of *sugar*, the most important ingredient, to which the various root-crops owe their value. A wide and rational view was taken of this subject. The plans for experiments and investigations were very practical, and aimed at ascertaining the following points for each variety or strain included in the experiments, viz.: *1*, The quantity, the number of cwts., harvested from a given area; *2*, average weight of the roots from different soils; *3*, the specific weight of the roots and their contents in percentage of dry substance; *4*, the percentage of sugar of each variety or strain of roots for several years.

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The bulk of a root crop is only one side of the question. The main question is: HOW CAN THE FARMER PRODUCE THE GREATEST POSSIBLE QUANTITY OF VALUABLE NOURISHMENT, IN THIS CASE SUGAR, *for his milch-cows and other live-stock on a certain area, at the lowest possible cost?*

In order to illustrate the importance of keeping an eye on the actual contents of nutrient matter in the roots, I beg permission to adduce two extreme examples: A lot of mangold seed of the Long Yellow variety, imported from Scotland, and distributed among Danish farmers in

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WE have arranged with Mr. Pedersen-Bjergaard that upon his arrival in Denmark he should secure for us a few cwt. of seed of either the new Mangel or new Sugar Beet, for cattle feeding, to which reference is here made. We have left it to his judgment upon further inquiry as to the results of the Danish crops of roots this year to decide which would be the better variety to introduce in America. At the time of going to press we have not yet learned which he has secured, but can rely upon his sending us seed of one or the other. A packet of this seed will be sent gratuitously to any reader of this book interested in the important subject of root crops for stock feeding who will cut off this portion of the book with his name and address on the opposite side, agreeing to carefully test same. **W. A. B. & CO.**

1892, gave the large yield of 945 cwt. of roots per acre on a clayey soil; the sugar percentage was 3.8, and the calculated quantity of sugar per acre was 36.3 cwt. Now another example: A new variety of mangold, produced in Denmark by rational crossing and careful breeding for a number of years, a variety not yet named and not yet brought into the market, produced 777 cwt. of roots per acre, which, to a superficial view, would indicate an inferiority in yield to the Long Yellow of about 18 per cent. But the percentage of sugar in this unnamed new variety was **9.3** PER CENT. and the production of sugar per acre—calculated upon the basis of the yield of roots and the percentage of sugar—was **72** CWT., practically double the quantity produced by the Long Yellow. Another new variety—a sugar-beet for stock-feeding, grown under the same conditions as the Long Yellow, and in the same year—yielded 407 cwt. of roots per acre; the analysis showed **10.4** PER CENT. of sugar, and the production of sugar per acre was 42.5 cwt.* This seems to me a very interesting example of the value of scientific methods in practical agriculture. *But for the analysis of the contents of sugar in the varieties of mangolds here compared, the Long Yellow would have been considered far superior to the sugar beet*, the yield in bulk of which was only about 43 per cent. of that of the Long Yellow, and still the new sugar-beet produced *15.6 per cent. more sugar to the area occupied;* and then what a difference in the amount of work expended in lifting, transporting, storing, and feeding these two varieties of roots!

Besides the varieties of mangolds to which I have referred, several other new varieties of great promise have of late years been produced in Denmark. In developing these new varieties the aim has not only

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* See offer in foot-note on page 29.

I agree to thoroughly test seed of the new Mangel or Sugar Beet, for cattle feeding, from Denmark, to be sent me free by W. ATLEE BURPEE & CO.

Name, ...

P. O., ...

County, ... *State,* .....

been to increase the percentage of sugar, but the highest possible perfection has been kept in view on the different points to which I have already referred. In choosing varieties for crossing the endeavor has been, alongside of other desirable properties, to develop a habit of growth of the roots above the ground, *which greatly facilitates the harvesting of the crop in a clean state*, in contradistinction from those varieties that penetrate deeply into the soil, which involves much more trouble and work in lifting.

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One of the seed-crops in Denmark that at the present day is best known and most generally appreciated outside of the boundaries of the little northern country is the *cauliflower*. For many years Denmark has produced steadily increasing quantities of cauliflower-seed of a superior quality. Formerly the crops of this seed were almost entirely disposed of to leading centers of the seed trade in Europe, whence the seeds were distributed to various parts of the globe, but of recent years the larger and more prominent seed-merchants in different countries, and especially in the United States, have supplied their wants of this article direct from the source of production.

It must here be remarked that with a few exceptions only one variety of cauliflower is grown for seed in Denmark. The strains may differ, and will differ more or less according to the locality in which they are grown and the care bestowed upon the management of the crop. But however the strains may vary in some more or less essential respects, they almost all belong to one type, viz.: the *Early Dwarf Erfurt*. But the strains which, under varying conditions, may have developed may vary, sometimes considerably. It is a well-known fact among experienced cauliflower seed-growers that hardly any vegetable or cultivated plant is more liable to deviate and deteriorate. It requires skill and experience to select the proper type of plants for seed in order to keep up the high standard of the variety in point of earliness, dwarf habit, sure heading, size, solidity, grain, and pure white color of the head.*

* During a visit to Denmark in 1887 we personally inspected fields of growing cauliflower in company with Mr. Pedersen-Bjergaard. We were most favorably impressed with the crop of one grower who had intelligently selected his strain of seed for sixteen years. This we arranged to secure, and to distinguish this special strain introduced it in America as BURPEE'S BEST EARLY. No cauliflower seed we have handled has given equal satisfaction, and each year since Mr. Pedersen-Bjergaard has carefully inspected the growing crop and seen that the quality was maintained in the seed.—W. A. B. & Co.

As experience has proved, and as is now pretty generally known, the natural conditions of Denmark for growing cauliflower seed to the highest perfection are not surpassed, if equaled, in any other country, as far as the Early Dwarf Erfurt type of varieties is concerned. This is probably mainly due to the high northern latitude of the country, the near proximity of the salt water on all sides, and the comparatively moist and cool state of the atmosphere. Whether the almost continual breezes from the surrounding seas have a share of influence in giving stamina to the seed I dare not assert, but think that such is very likely the case.

It is a well-known fact that the further north the variety of cauliflower seed here in question is grown and brought to perfect development, the better results will the seeds generally give, with regard to *sure heading, early maturity,* etc., *than when sown in more southern latitudes and warmer climates.*

The cauliflower ought to be much more generally grown by every farmer and every owner of even a small kitchen-garden than at present, and it ought to constitute a much more frequent part of the bill-of-fare in every household, rich or poor. *It is one of the most nourishing, easily digestible, delicious, and easily and quickly prepared vegetables grown.* There are scores of recipes for cooking this most delicate esculent. While cabbages require four and one-half hours for digestion, cauliflowers can be digested in the course of two hours, and may be enjoyed with benefit by persons to whom cabbage would be ruinous owing to week digestive organs.

Although Denmark does not aspire to ever becoming recognized as one of the great seed-producing countries of the world, and, indeed, must look to more genial climes for a great variety of seed for her own planting, yet, I think, horticulturists and agriculturists generally will agree that for the production of seed of the important vegetable last named, and of certain hardy and productive grains and valuable grasses for special purposes, the very situation and climate of Denmark give her peculiar advantages.

AMERICAN SEED GROWING.

By C. C. MORSE, of California.

[Essay Read Before the Seedsmen's Session of the World's Auxiliary Horticultural Congress at Chicago, August 17, 1893.]

IN the presentation of this paper it seems to me that an elaborate history of early-seed growing is not expected of me nor many details of well-known and approved methods; but rather some criticisms upon some questionable practices, and commendation of such methods used by growers and seedsmen as should be approved, as well as what I believe to be some of the practical attainments of the near future.

All will agree that great advancement has been made in the production and distribution of garden seeds within this generation, for seed growing is taking definite shape as rapidly as any science that is before the world to-day, and I expect as many changes within the next decade as there has been in the last, accelerated with greater possibilities of development.

Seed growing as a definite business has assumed its position within the memory of most of us. Years ago the gardener would save a little seed—some of it volunteer—some from roots never transplanted; all from unknown types and unknown varieties; and frequently after using the best vegetable crop the poorest would be allowed to go to seed and the product then sold or bartered with the neighbors for other kinds grown in the same manner. Of course, there were exceptions to this rule, for some gardeners would intelligently select the best vegetables, having the points of excellence well in mind, and would continue to select and grow some good seed, and would improve the types as fast as nature would permit.

The limited custom of distributing seeds would not admit of much profit to the grower, nor of any extended information to the people, especially to those most interested, since the seed business was carried on in a small, local manner, and the people were not informed by carefully written catalogues, nor by men traveling over the country in the interest of seed houses.

Only a short time ago carrot seed was delivered with the beards on, and a very poor sample too ; and lettuce seed was poorly cleaned, when half the bulk can now be sent to the chaff pile. In my observations I have seen some growers practicing some things too near the ancient methods to be approved. I have noticed some growing cabbage seed without transplanting after it had headed, and others marketing the head and growing seed from the stump. Some planted onions that had the appearance of having never matured, and allowed lettuce to grow so thickly that the plant could show no definite character,—it would seem with the purpose of producing seed only, rather than promoting the quality of the vegetable.

Nature has provided that the coarsest, hardiest, nearest approach to the wild nature will be the most abundant in the production of seed, while the finest grain and finest flavor will be very shy in producing seed ; and the grower will not proceed very far before he will discover that the best vegetable seed cannot be produced as cheaply as the poorest. The difference is very great, and as long as competition is in price, instead of quality, progress will be greatly hindered, and the efforts of many seedsmen to obtain their supply lowers the cost of growing good seed and will be the greatest hindrance to advancing the quality of many kinds of vegetables.

The present custom of publishing fine catalogues is doing more to educate the people than any other custom that is before the world today. There may be some very extravagant things said in some catalogues, but they will not be harmful in the end, as they will teach all interested the trend of what is wanted by the public, and enable the producer to cultivate in that direction. These fine catalogues, the system of trial grounds in use by the large houses, the system of large growers subdividing their farms into specialties, each with a foreman, an expert in his division, and the growing conviction that each kind of seed should be produced in a climate where the vegetable attains the highest perfection,—these all tend to raise the character and quality of the vegetable, as well as the sample of seed offered to the public.

Every seedsman should have as complete a system of trial grounds as possible, where the vegetable can be grown to maturity, as it will quickly teach him who is supplying carefully grown seeds in an intelligent manner ; and the person in charge of such grounds should be a man of large and comprehensive ideas, and as free as possible from petty prejudices and favoritisms.

It is not only to know that the seed germinates well ; furthermore, the finest strains are liable to be of weaker germination than the

coarser varieties. It is not, however, the case with all kinds, and a practical seedsman knows where to draw the line. The demands of some seedsmen who expect seed to germinate nearly 100 per cent. are a hardship and waste to the grower, and some accepted system should be devised whereby merchantable seed should be understood and agreed upon.

If we are to increase the seed business, we are first to educate the people how to grow the vegetable in the best manner possible, both as regards productiveness and quality. To some extent vegetables resemble fruit—if of good quality and approved by the consumer large quantities will be raised, and the better the vegetable the more sale there is effected, and consequently more demand for the seed ; for example, careful selection has so improved one of our standard varieties of lettuce that it requires the product of thirty acres for our trade, while two acres seemed sufficient fifteen years ago, and I have no doubt the same increase will be expected on many of the other varieties if given the same attention.

Take the history of the tomato as an article of food. Its introduction is within the memory of some of our seedsmen, and now it takes its position with the potato and the cabbage as a common article of food, for by selection and hybridization it has been changed from the little pear-shaped "love apple" to a magnificent fruit, affording a source of great profit to the farmer, gardener, and canner, who put it into the hands of millions of this generation as a delicious article of food, while it was entirely unknown to the generation that preceded us. Perhaps the same can be said of nearly every vegetable we grow. The introduction is not very remote, and the development to the present attainment belongs to this generation.

Garden seed should and will be grown in a climate that is most favorable to the production of the vegetable. One favorable for the growth of vegetables where the seed is eaten (such as peas, beans, etc.) would be one that induced rapid growth, for we know that the seed is wanted as soon as possible after sowing, as it is the seed only that is sought by the gardener, and it would be difficult to get an early sort where vegetables grow slowly. For the class of vegetables of which the substance is eaten or used (such as lettuce, cabbage, cauliflower, etc.) a climate should be selected where the growth is slow, since the longer the period of running to seed the better, especially so with lettuce and cabbage. If the seed stock in lettuce makes its appearance almost as soon as the lettuce is in head the result is very unsatisfactory, as the quality is regarded as very poor.

In the climate of California (where my seed farms are located) lettuce planted in December will grow fairly well all winter and spring, but will not run to seed before July or August, or only about as early as seed planted about Rochester in April. This long time in which seed may mature is very favorable to the character of the plant, and also for half-mature seed.

Stock seed should never be saved in a year when the crop has suffered from hardship in any way, as it tends to run the vegetable toward the hardy side, instead of a fine grain and tender. Very choice vegetables only should be selected for stock seed, of just the type that the grower intends to perpetuate. The type once fixed, he should not deviate from it, and should be prepared when planting the stock seed, so that it will not be necessary to use a poor or injured crop. All vegetables of a root or bulb character should be grown to maturity in the best possible manner, and then taken from the ground to stop the root growth, so that when replanted there will be a fibrous growth, which is the proper development for biennials, and any effort to plant one kind of growth into the other has a tendency to run the plant toward the wild state.

I believe there is to-day a very worthy and creditable competition in the seed trade to have the very best seeds, finest types, and honestly to distribute the same to their customers. The eagerness to seize upon any novelties that are offered seems to convince me that competition in coming years will be solely on the improved vegetable.

In conclusion allow me to say that California has assumed a very prominent position as a seed-producing location. The business of growing seed there was begun by R. W. Wilson, formerly of Rochester, N. Y., who began by growing a few acres of lettuce and onions in 1875. From that day the growth of the industry has been most remarkable, until there is being grown to-day no less than 2500 acres of garden seeds, including in large variety onion, lettuce, cabbage, cauliflower, celery, collards, beet, endive, salsify, parsley, parsnip, leek, spinach, tomato, radish, etc., besides several acres of flower seeds raised by growers who make a definite business of it. In the southern part of the State a very large acreage is devoted to the culture of beans, including a large proportion of limas.

My observation as a wholesale grower leads me to believe that there are so many avenues of experiment and study open to the horticulturist that the near future will develop more novelties and higher standards than some of us think it possible to realize.

From THE FLORISTS' EXCHANGE, *August 26, 1893.*

DISCUSSION OF THE ESSAYS.

MR. WILLIAM MEGGAT, of Connecticut, being called on, said he thought the selection and hybridization of plants was sometimes carried too far. Take, for instance, the Golden Self-Blanching Celery and White Plume. Some growers persisted in discarding all the green plants. His experience had been that if these green plants were weeded out the constitution and size of the vegetable were destroyed, and it was well to have some of them in. He had noticed in the seed-bed where these varieties and some others were sown the seed of the green plant was the largest, had the most vitality, and produced the biggest plants in the seed-bed. Gardeners often took the largest plants and had too large a proportion of green celery, whereas from a second planting, where the smaller plants had time to grow and develop more, he had nearly all of the desired kind.

In some sections of the country there was a great deal of fault found because the Boston market celery did not sucker as it did near Boston. This he had demonstrated to him by a friend near Boston, who took plants that showed an inclination to sucker in the seed-bed. These plants when transplanted, however, did not sucker.

The word "earliness" did not amount to much. It was very doubtful in his mind whether they were making any progress in that direction. Some people recommended Northern-grown seed because it was hardy and early. Any Northern variety of early vegetable was desirable; but if they went in for earliness entirely they were likely at times to sacrifice quality and always size. In a great many, if not in all cases, earliness in Vermont or Minnesota was desirable; but in New York, Pennsylvania, and Ohio it did not amount to much, and in the Southern States it amounted to nothing, in his opinion. A certain length of season and a degree of heat were necessary to produce the required vegetable; and it was impossible to get seed to produce a late as well as an early variety in Southern States where the conditions were the same. As an example, he cited the case of the Lima bean, which grew and flourished luxuriantly in a hot climate. Take the seed of it grown in Connecticut, Pennsylvania, Delaware, and Southern California, and plant them in the trial grounds, and it was impossible to tell which was the earliest. That bean required just such a length of season to grow, no matter where the seed came from.

One question that had been suggested by the essays was how they could do away with so many varieties. He thought that could be done by growing only the best of its kind. There were some thirty or forty varieties of early peas; but those who grew the best would have no difficulty in filling an order.

While there were some things in the papers read which Mr. Meggat did not agree with, he said they were the most intelligent and learned papers he had ever heard. "We American seedsmen want to push on and get better posted in our business; know the whys and wherefores, and accept nothing for granted. Like the superstitious Connecticut farmers, we have got a great many ridiculous ideas we want to get rid of. We are advancing very rapidly, and, if we push on, I think we will meet with success." [Applause.]

In answer to a remark of one essayist, Mr. Meggat said it was better to select stock at all times from well-developed seed grown at a favorable season.

Mr. T. W. Wood, of Virginia, rose to speak in defense of the South, because it had not been heard from at all. The South had not been considered a seed-growing district; everything must be Northern grown. He asked, were they perfectly correct in that? He was inclined to think that the South had a great deal more in it than they imagined, and would probably develop to greater proportions in seed growing than they expected. As an example, he cited the case of the potato. Only four or five years ago everybody wanted a Northern-grown potato; but what was it to-day? The market gardeners of Pennsylvania and New York were demanding Southern-grown second-crop seed, and why? Because they had found that they would produce a larger crop of potatoes. These now formed a large trade, whereas five years ago a man would have been looked on as having no knowledge of potatoes had he offered Southern-grown seed.

Take beans as another instance. The Northern-grown pole bean was a loose-clinging variety; it did not cling to the pole well, the Southern-grown bean clinging much better.

He also differed in opinion regarding the egg plant. Where the plant came to the greatest perfection, there, he believed, was the place to get the seed. Much finer and better germinating seed could be obtained in the South than in New York or New England.

Professor Wittmack * said they found in Europe that very good

* Prof. Dr. L. Wittmack, of Berlin, representative of the German Government, also read a paper on "Horticultural Displays at Future World's Fairs."

plants and vegetables were obtained from some seed grown in southern countries. While that was true of these, there were other countries in Europe where, owing to the coldness of the climate, it was impossible to ripen seeds. The German seed-raising firms of Benary, Haage & Schmidt, and others, had parties located in the countries on the Mediterranean, Algiers, and southern part of France who grew special seeds for them. Such seeds would not ripen in Germany, still good results were obtained when they were grown in the North. The seed of the best small-headed cauliflower raised in Germany was obtained from Italy. They also imported much of their cauliflower seed from Denmark. They must not think that seed grown in the South would not give as good vegetables as that raised in the North.

Mons. de Vilmorin thought that the question did not at all differ from the principle laid down, viz., that the place where a seed of any vegetable was grown was the place where that vegetable would be produced in its most perfect and best developed form. Some seeds, many of them, might be harvested very conveniently in the North; but with some other kinds growing seed away from the South would mean no seed at all. They in France and Europe could not expect to grow well and cheaply tomatoes or any of those very early plants except on the shores of the Mediterranean, and even south of the Mediterranean, because north of it the necessary amount of heat in the summer was deficient.

Mr. A. W. Livingston, of Iowa, referred to what Mr. Allen had said in his paper about selection of the first ripe fruit for seed. He found in his selection of corn that in the first ripe fruit two ears to a stalk were often obtained, but he would never select that kind for his stock seed unless it was in a country where it required early planting. The corn was generally short, there was no such ear on it as there would be on the next later kind.

With regard to running out of certain plants and certain kinds, he had a sweet corn which he had had for forty-two years. It was just as good to day as it ever was; but he selected the seed. The Paragon Tomato he had grown for twenty-five years, and it was just as good to-day as it was when he brought it to maturity. He did not think there was much danger of crops running out if proper selection was made.

Mr. Livingston then narrated a case where he had bought melons of the Cuban Queen variety in Iowa, which to all appearance were first-rate goods, but on being cut they were not fit to eat; they had no taste at all. He thought the difficulty there lay in the soil.

Professor Bailey, of Cornell, was the next speaker. He eulogized M. de Vilmorin's essay ; it endorsed some truths presented by that gentleman's father in a most remarkable paper on the heredity of plants, which appeared some years ago.

He was pleased to hear M. Vilmorin speak of his methods, and to note that he felt that heredity meant selection,—meant a law in regard to the improvement of plants. Professor Bailey was fully prepared to say he believed there was nothing random in nature. Wherever a variety of plant was got it came from some law which might be unknown ; it should be our purpose to find out the laws that govern the selection and improvement of plants.

He had been called on as the originator of the Ignotum Tomato, which had been received in some parts with favor. He took no credit as the originator ; it simply chanced to come up on their grounds, starting from a very inferior sort, and by selecting for two or three years he had succeeded in fixing the type. It might seem that this Ignotum Tomato, coming as a chance seedling, from a parentage very inferior after all, was a mere matter of chance, with no connection approaching to scientific law. He could not tell where the Ignotum came from ; there was some reason for its coming. Having once found a variation, it was the province of man to experiment with it and to endeavor to mature and fix that variation so that the plant could be relied on and offered as a commodity, and this was where skill and experience could be brought to bear. Men could not do much in the way of originating variation in plants ; that lay beyond their control ; but so much depended on the selection of variations, when they did appear, that they ought to try to induce a good variation first. The tendency to variation was itself a variation which they must fix ; they must fix that heredity in the plant just as much as they would color, size, or fragrance ; they must endeavor to continue the tendency to reproduce itself, and when they had done that, they would have accomplished one of the most important things that could be accomplished by selection.

The speaker then went on to treat of the physiological nature of the paper. For various reasons given it indicated that plants were amenable to external conditions and especially amenable to selection. The more crossing in ancestry, the longer will it take to fix the variation. He thought cross breeding was carried too far ; that by promiscuous crossing instability was introduced which it would take several generations to breed out.

THE SEEDSMAN'S TRIAL GROUNDS.

BY W. ATLEE BURPEE.

[READ BEFORE THE CONVENTION OF THE AMERICAN SEED TRADE ASSOCIATION, CHICAGO, AUGUST 14, 1893.]

TO thoroughly know seeds and the relative value of their products, both of his own and his competitor's stocks, to learn the comparative merits of newly introduced or proposed novelties, carefully conducted trial grounds are to the progressive seedsman and his assistants the open book of nature. By trial grounds we mean the planting and cultivation of the various grains, grasses, vegetables, and flowers in the open field or garden, each sample being numbered and careful records being kept from notes taken at various stages of growth.

Some years ago we were amused at the claim of a large seed house (no longer in existence) that immediately upon receipt they took three samples from each bag of every lot of seed,—one from the top, another from the middle, and a third from the bottom of the bag,—to test for germinating power. Every careful seedsman will, of course, on warehousing his seeds, test a sample of each lot for vitality, but he would be a poor seedsman who obtained his supplies from such doubtful sources that the bottom of the bag should not be uniform with the top or middle. Furthermore, this very emphasis laid, as a guarantee to planters, upon the thorough vitality test of the seed, brings out prominently a question as to the quality of the produce. That seeds grow is of prime importance, but this can be proven even by the planter himself before he sows the seed; of equal, nay, of greater, importance is the knowledge that the seeds planted will yield the best products of their kind. This knowledge can only be attained by thorough comparative growing trials conducted each year under conditions as nearly as possible the same as the seeds will receive in the gardens, fields, hot-beds, or greenhouses of the private planter or market gardener.

The object in the conduct of trial grounds is the attainment of knowledge—truth; but, as already intimated, this is threefold in its purposes.

(1) To Know the Seeds He Sells.

A seedsman may travel all over the world, inspecting the various crops for which he has contracted, but he cannot know that he actually receives the products of the fields he has inspected unless after arrival their trueness to type is proved in his trial grounds. It is only by such tests that he can insure against inferior stocks or wrong varieties. Mistakes are by no means always to be attributed to intention to deceive, as they often result from ignorance or carelessness. Just a point in illustration: The past season, as was universal, our crops of American Wonders and Premium Gem Peas were short, and we sought to make up our requirements by purchase. We gladly bought a lot of each from a fellow member of this Association, who freely told us the name of the grower in Canada, a man of good repute, whose stocks he said he knew were right from personal inspection while growing. A row of each of these, as of every other lot, was, of course, planted at Fordhook, revealing to us, as well as to the astonished seedsman who sold the peas, a fine, straight sample of Premium Gems labeled American Wonders. Both lots were identical. The seedsman promptly offered to refund the difference in price, but that could not recompense for the harm done, nor relieve our chagrin that a hundred or more customers the past season received from us Premium Gem Peas under the name of American Wonders. This seedsman has no trial grounds and might never have known of his mistake had we not acquainted him with the fact, for retail buyers do not always complain, some from ignorance of what the true type should be, and others because they conclude that the substitution of a cheaper variety was dishonestly done for the sake of a larger profit.

To-day as we write, comes to hand that excellent little paper, "*Gleanings in Bee Culture*," for July 15th, where, on page 573, a writer from Missouri, in the course of an interesting article on gardening says:—

> "Talk about peas! I always thought one had to plant a big lot of seed to get a few peas; but I have changed my mind this year. American Wonder, ——'s catalogue says, grow six to eight inches tall, so I gave them no

bush to climb on, and they just sprawled out all over the ground some 18 to 24 inches, but, nevertheless, they gave us plenty of nice peas."

To this the versatile editor, who is himself something of a seedsman, replies :—

"Very good, friend M. Some of the rest of us have found that the American Wonder peas, for this year, grow a little more than six to eight inches. I do not know whether it is the extra soil up in Michigan, where they are raised, or whether they have got tired of being dwarfs, and have gone back to old times, or what is the matter. Nobody has complained, that I know of, because they give a very large crop of extra nice peas, even if they do go over more ground than the orthodox ones ought to do."

Others of you may have had similar experiences, and this may explain why in a season when American Wonders were scarcely a third of a crop there were still "enough to go round." Is it well that nobody complained? An experienced market gardener certainly would either have complained most bitterly, or quietly concluded that the seedsman intentionally deceived him in selling Gems for Wonders.

Such cases show the value of trials in testing stocks that have been purchased, but comparative trials are of equal importance in testing stocks either of the seedsman's own growing or of his own contract crops, while as a check upon the contract growers they are invaluable, being most conducive toward insuring careful "rogueing" and toward counteracting the temptation which a grower often meets in the event of a short crop, to purchase other crops, which can be handled at a profitable margin, but which are hardly of the gilt-edge type the careful seedsman would want to supply to his market garden trade. Furthermore, the trial grounds reveal clearly the result of selection of stock seed in any given line; they also make clear a point upon which there is frequently uncertainty on the part of the seedsman as to the best sections in which to grow their general supplies or the stock seed of certain varieties. For instance, it is a common practice in the seed trade to grow pole beans far north, in field culture without the use of poles. Our trials for years past have indicated that this is very detrimental to the climbing tendencies of pole beans. We have noticed that White Creaseback Beans, obtained originally from Louisiana and climbing most luxuriantly, largely lose this habit of sticking closely to

the poles after being grown far north in field crops without poles. We could mention many other instances where our trial grounds have shown that some sections (largely used for seed-growing) are decidedly unfavorable to the production of the best seeds of certain vegetables. The luxurious growth which carrots and turnips attain in California and Southern Europe seem to give an inbred tendency to seeds of these vegetables grown there to reproduce a superabundance of tops at the expense of large, well-formed roots. Similar genial climates, so conducive to luxuriant vegetation, also produce a superabundance of foliage (outside leaves) to cabbages. These are simply a few instances from observation of stocks grown in different sections; of equal importance is the careful study of the various strains of seeds, to note whether the selection of stock from year to year is being intelligently made and the types continually maintained or improved.

Well-conducted yearly tests of one's own stocks are necessary, not only for the purposes named, but are also useful in giving the seedsman the best possible school in which to educate a trained class of employees. Every year some of the most promising of our young men are drafted to the farm for the planting, growing, and harvesting season. Some of these work in the trial grounds and some among the field crops growing for seed, but all have free access to the "finder," by which they can learn to know the various vegetables, grains, grasses, and flowers. When such a man returns to the store, a packet of seed is more to him than merely one of thousands tied up and stored in hundreds, he being familiar not only with the plant, habit of growth, and use of the plant or flower, but also with the distinctive characteristics of the varieties. Young men with such training make intelligent counter salesmen and rational thinking clerks in filling mail orders, sometimes eventually developing a capacity for taking charge of a department or of starting in business for themselves.

(2) To Know His Competitor's Stocks.

The wide-awake seedsman will not be content merely to test the strains of seeds which he himself is selling, but will also want to know how they compare with seed of the same varieties sold by other growers. This is a most important use of the trial grounds, for it may be that one of the seedsman's competitors has devoted very special attention to a given variety, and while his own stock of this variety may be good, his competitor's may be better. The seedsman who annually conducts thorough trials is not obliged to wait for a falling off of trade to tell him that other houses are selling better strains of seeds of any varieties

than his own. Such comparative trials will keep the progressive seedsman thoroughly in touch with the work of growers, both at home and abroad, and will sometimes show that he should drop stocks which he considered first-class and adopt in their stead others which are better. This is an age of progress, and it should be the aim of every seed grower to attain in each variety of seed as nearly to perfection as possible; one man, often a market gardener, may develop an improved strain of a given specialty; it is the business of the competent seedsman to secure the best of each variety.

As might be expected in a business so modern in its development, the standard of quality for seeds is continually advancing; twenty years ago it was comparatively easy to build up a new seed trade by careful attention to ordinary details, as trial grounds were then almost unknown and the public were not so critical in their purchase of seeds. To-day the conditions are changed, and while many purchasers are still ignorant of the types of the different varieties, a large proportion can discriminate, not only between varieties, but also between good seeds and better. So steadily is the public advancing in ability to discriminate, that to-day it is hardly possible for jobbers in the seed trade, either at home or abroad, to do a large trade merely because of low prices; the retail dealer and florist is fast learning that he can only hold and extend his trade in seeds by handling such as are known to be true to name and of first-class quality. We think it will not be long before the better class of retail dealers will demand as their right the inspection of the trial grounds of the seedsman from whom they obtain their supplies, so that they in their turn can intelligently recommend the seeds which they handle.

(3) To Learn the Comparative Merits of Newly Introduced or Proposed Novelties.

The keen appetite for "novelties" now leads every hybridizer or discoverer, particularly European growers, to herald any variation or improvement as something new and extremely valuable, painting its description in glowing colors. To appease this appetite too many seedsmen take the so-called new varieties under the introducers' descriptions and herald them broadcast throughout the land, without any personal knowledge as to their respective merits or demerits. This is seldom safe. A seedsman's customers have the right to assume that they can trust the descriptions in his catalogue. Never, unless in very exceptional cases, should the seedsman run the risk of betraying this confidence by recommending a variety of which he knows nothing person-

ally ; it is better to wait a year to test the variety and prove whether it be of real merit or not. It is hardly necessary to enlarge upon the importance of this, as we all know how many of the novelties continually introduced either fail to be of distinct character or to show marked improvement upon existing varieties. We are glad to notice that much attention has lately been devoted by Horticultural Associations and State experiment stations to condemning the pernicious practice of renaming varieties for the sake of securing "novelties;" this is particularly objectionable, but is clearly revealed to the seedsman who studies his thorough trial grounds. The past spring we had in our trial grounds five samples under five different names, from different seed houses, of an early lettuce, all of which proved to be the same, and annually many of the so-called new varieties received from home and foreign growers prove identical with old varieties with which, perhaps, as doubtless is often the case, the supposed introducer is not acquainted. From a mere pecuniary standpoint it never "pays" in the long run to introduce or recommend a novelty unless it is both distinct and valuable : it is far better to hold the confidence of one's customers so that they will recognize the fact that reliance can be placed in the statements of their favorite seedsman.

Again, it too often occurs that old varieties of established excellence are dropped to make room for newer sorts which the seedsman thinks will sell better. Kindly permit a personal case to illustrate : we all know that many varieties of cabbage have been introduced in the past twelve years, we ourselves having introduced several, and yet in all that time we have been careful to select and maintain the Surehead Cabbage, introduced seventeen years ago, and the fact that we still annually sell 20,000 packages more of this variety than of any other demonstrates the advisability of never dropping a variety because it is old,—unless there is something new to fill the same place that is really better. Although given centuries before trial grounds were thought of, there can be no better rule for their conduct to-day than "To prove all things, and hold fast to that which is good."

By thorough trial grounds giving comparative tests of one's own stock with his competitor's stock and with everything new that is offered, the seedsman is enabled, by careful comparison, to detect synonymous varieties. In the generally well-edited catalogue of a prominent house we were surprised to notice the following paragraph in the introduction this season :—

"In our last year's catalogue we endeavored to offer a

> less number of varieties, selecting only those that were the very best, but we have discovered that the extent of this country would not admit of the condensation of varieties, as many of them, although really duplicates of other sorts, have their local popularity, and are only known by local names. These duplications can only be reduced by practical experience and thorough testing."

Now, others may differ with us, but we honestly think it should be the practice of the seed trade never to sell the same variety of seed under two names, but where necessary, besides the proper name to give the synonyms in brackets. The closing sentence of the paragraph just read says that "These duplications can only be reduced by practical experience and thorough testing:"—such thorough testing, with experience to judge, certainly should be the business of the seedsman. Red Valentine Beans are generally well known throughout the country, and the fact that they are sold in the Baltimore market as Red Marrow should not induce the seedsman to catalogue Red Marrow separately, thus misleading some with the impression that it is a different bean. A seeming exception may rightly be made in so important an item as extra early peas, of which each seedsman naturally strives to have the earliest and best strain, and as a sign of his faith can properly attach his name, but this is no excuse for offering, as do several catalogues, extra early peas under half a dozen or more different names, when there cannot be in the warehouse of any seedsman so many distinct strains of what was originally known as Philadelphia Extra Early Peas. We thoroughly advocate giving all the synonymous names in brackets where there is no doubt of the identity, except in the case of names given by a few houses who make re-naming so common a practice that only the most ignorant can be deceived.

A greatly needed reform that can only be accomplished by a thorough system of comparative trials is the securing of accurate descriptions and life-like illustrations of varieties. Carelessness in this respect has been altogether too prevalent. For instance, a few years ago the orginator of the Banquet Melon was quite exercised as to whether he really had the novelty that he believed, because a seedsman used in his catalogue an illustration of a melon from a photograph that was identically the same in outer appearance as the Banquet, and nowhere in his description did he mention the color of the flesh. Comparative trial demonstrated the fact that the other melon was green-fleshed

while the Banquet was salmon-fleshed. Such carelessness in description is inexcusable, but how much more frequently do we find inaccuracy in illustration. This year we are growing Nott's Excelsior Peas, having become convinced of their merit, and, with a view to cataloguing same next year, had photographs made from which to have an illustration engraved. In doing this we referred to the catalogues of the two seedsmen (both recognized as honorable houses) from whom we had obtained the seed for planting, to see in what manner they illustrated the variety. One we found used evidently a fancy engraving, as it did not in any respect resemble the variety, the peas being well-rounded, whereas they are always so crowded together in the pods that they are flattened at the sides, like the Potato Lima. The other firm had used (probably unknowingly) to represent Nott's Excelsior an illustration which was engraved from a photograph taken some years ago of our Quantity Pea at the time of its introduction.

As Chairman of your Committee of the Seed Division of the Horticultural Congress, to open on Wednesday, I can promise several very interesting papers, by experienced European and American horticulturists, hence I will avoid the temptation to trespass further upon your time in mentioning many interesting facts revealed in our trial grounds this year and past seasons. In closing, however, with the hope that others who have trial grounds may do likewise, I would extend to the members of this Association who may travel East, an invitation to stop over in Philadelphia and take an easy hour's journey to Fordhook Farm, where our trials will be freely shown and methods fully explained.

FROM THE ESSAYS AT CHICAGO, AUGUST, 1893.*

WHEN the White City has become a thing of the past, with all trace of where the magnificent buildings once stood completely obliterated, the sayings of the wise men who spoke at the Congresses will still be remembered. Our own Horticultural Congress, led by not only our own wise men, but those also from the far-off East, was a grand gathering, and a few extracts from the proceedings, here reproduced, will not be out of order at this time.

Professor Trelease on "Technical Horticultural Education."

Specialism is the only way by which rapid progress can be made, and the world now expects it; but unless care is taken it dwarfs the individual, rendering him narrow, and at the same time opinionated, and to this extent lessens his usefulness and defeats its own end. * * *

Technical training is intended primarily to make specialists. It is eminently practical, and its utility is measured by its practical results. * * *

There does not exist a single American school of which I know that has a systematic, well-balanced course in the theory and practice of horticulture, from which any considerable number of practical horticulturists are graduated, nor do I see any present prospects of a change in this respect. * * *

For several years members of the Society of American Florists and other intelligent and thoughtful men have been agitating the question of a school of floriculture. Their business is one of increasing dignity and profit, and there is room for the employment in it of a great deal of taste, technical knowledge, and intelligence. * * *

Mr. Dyer, the director of Kew Gardens, does not consider schools of gardening beneficial. He looks on gardening as a trade, best learned in the practice; and it must be admitted that many of the best gar-

* Under this heading THE FLORISTS' EXCHANGE, September 30, 1893, gives a number of well-chosen extracts. Those from papers read at other sessions than the Seedsmen's Division we take pleasure in reprinting. We have omitted the extracts from President Bonney's opening address, and also from the papers and remarks of Messrs Vilmorin, Allen, Burpee, Morse, Meggat, and Professor Bailey, as these will be found printed in full in the preceding pages. —W. A. B. & Co.

deners have risen through the great seed and plant establishments, without any schooling other than that of every-day routine and home reading. * * *

Brawn is not so well paid as brain because it is more abundant, and few intelligent men, with the power to rise higher, are willing to set for their ideal the lowest standard in their profession. * * *

Of theoretical gardeners I shall say nothing, because the demand for them as a class is not very great, but there is a steady demand for both laborers and educated, practical men. * * *

The kernel of the problem of horticultural education is to teach the trade of gardening well, as a trade, and to supplement it with thoughtfulness, observation and a taste for experimenting, and enough learning to bring the man in touch with his fellows and to enable him to make his attainments useful to them as well as to himself. * * *

The obstacle in the way of evening classes (which at present is the best method open) is that few cities can supply for them students enough to warrant the labor and expense of maintaining them and supplying them with good teachers. A fair substitute might be organized among the younger members of every large plant establishment. * * *

No isolated school can keep together a body of good horticulturists as teachers unless well endowed and well patronized by paying students. * * *

To be successful in America at the present day, a school of gardening must possess ample facilities for growing plants of many kinds in considerable quantities. It must be equipped with the necessary laboratory appliances, and it must count manual labor as an essential part of its course, and limit other instruction to strictly practical subjects, taught almost exclusively in the field and the laboratory. It cannot put the age of admission too high nor the requirements for admission, nor insist upon too long a period of practical experience as an entrance requirement. * * *

I do not see how in this country a gardening course extending over more than two years can be made to attract and hold many students, unless free tuition and some further gratuity is given, but while a two years' course must sacrifice some of the manual labor of a longer course, I believe that it would be very helpful to those wishing to become practical gardeners or florists—it being, of course, understood that it must be rounded out by further practical experience obtained in good establishments either before entrance or after the completion of the course. * * *

If a sufficient number of pupils could be counted upon, I believe that private or governmental endowment for a school of gardening worthy of the name could be secured within a few years. Is it wanted and would it be used?

I most heartily wish that you may succeed in establishing higher schools of gardening; but first begin with the lower ones, that is the most important subject.—DR. WITTMACK, of Germany.

France had only two grades of horticultural schools; they did not possess, neither did they see any urgent necessity for, a lower grade of gardeners, whose aspirations did not go beyond being useful and efficient workmen. For these evening lectures were provided, either through the horticultural societies, or simply by the efforts of employers.—HENRI DE VILMORIN, Paris.

Agriculture must succeed because it is the foundation upon which rests all other industries; but it did not succeed in comparison with mechanical pursuits, therefore, something must be wrong with agriculture all the country over. * * This country had not come to the period to which the French, Germans, and other European nations had got, when we needed especial training in the minute laws of horticultural work.—PROFESSOR BAILEY.

Supt. McMillan, of Buffalo, on "Improvement and Care of Public Grounds."

The fine qualities of many of our native shrubs are largely ignored in selecting plants for ornamental shrubberies. For many fine kinds there is so little demand that nurserymen do not propagate them, and those they do handle may be imported plants raised abroad from exported seed. This may be partly due to divers conditions here of climate and cost of labor; but it shows public indifference to a remarkable extent. * * *

Planting for autumn effect is worthy of experiment on a large scale, but it is rarely considered. * * *

The elements of natural beauty in the distinctive forms and in the foliage of tree and shrub in the spring and summer stages also receive scant attention in general. The difference in size and shape, and habit of growth, and in the shades of green are infinite, and the manner in which they mingle and blend in combination is natural beauty of the highest order. * * *

Broad-leaved evergreen shrubs are also a distinctive class of great beauty when their native qualities can be fully displayed by thrifty, vigorous growth. Their bright foliage is especially valuable in winter if it be above a zero temperature. * * *

Every plant is beautiful or not in proportion to the vigor of its growth—the best measure of a healthy condition. * * *

In the planting for landscape effect, the future development, both near and far, must be taken into account. * * *

A prominent floral display of exotic plants is not in character with the general tone of a rural landscape. The contrast is usually too strong to be agreeable, but in small grounds of a formal type, or in sections of a larger ground, where artificial constructions are prominent, the luxury of a flower garden will be more fully enjoyed. * * *

The taste which perceives the scenic value of such places and conserves them for the public enjoyment is a promising sign of the strength of public sentiment, which, in any community, may be depended on to support all intelligent effort in the improvement of the public ground, to conserve and develop its natural beauty.

Besides the natural and architectural schools of gardening there was another which was fast occupying a place in horticultural history, and that was the "Composite." That was a school which recognized virtues in both the other schools. * * *

The great French landscape gardener, André, had expressed it as his conviction that the composite style of gardening would become the most popular because it was the prettiest, and was willing to recognize beauty, whether of form or color or growth, or in any other way. * * *

I know that the school which Mr. McMillan represents objects to all colored foliage, such as is produced by the purple beech, Prunus pissardi, the golden Sambucus, and others. They find no place in their schools of gardening for such things. Are they not intrinsically beautiful, and would they hurt or would they help the adornment of such places? * * *

In view of the effect that flowers had on civilization he was surprised that the school of gardening known as the "natural" school ignored color altogether in the production of the landscape which it was their duty to create.—ROBERT CRAIG.

A good landscape gardener ought to blend color with trees in the

shape of pretty flowers. A variety of color was exceedingly useful, and made a lasting impression on the eye.—M. DE VILMORIN.

Gardening, it seemed to him, was not a mere matter of form ; a mere matter of reproduction of contours, of circles, or of undulations ; it was a matter of form and color blended in such a way as to produce the greatest pleasure to the greatest number of people, and to be restful and fascinating.—PROF. TRELEASE.

There was a time and a place for everything, and it seemed to him that the so-called natural style of gardening was detrimental to the florist. He then went on to describe the exactments of the naturalistic school. Everybody had a right to ornament his garden as he pleased. A good many things had been said about the formality of the present style of gardening, but he wished to say that it had done more to create a love for horticulture and to promote horticulture than any other style.—JOHN THORPE.

The taste in the arrangement of decorative flowers in the United States was entirely different from that of Germany. In some respects he thought the American decorations were a little too realistic and very often too stiff, and he wished that these might be improved in this country.—DR. WITTMACK.

Nature makes use of color in a very easy and informal way, and if we are to introduce masses of color among trees and shrubberies in such places where naturalistic treatment has improved them, then we should introduce them in a naturalistic way, in groups which are irregular, as if they occur there naturally. Do not scatter them over a landscape, for they will be like so many blots of ink upon the whole scene.—PROF. BAILEY.

Charles D. Garfield on "Relation of Experiment Stations to Horticulture."

He asked them to give the experiment stations enough work to do. Commercial success was endangered by fussing with experiments.
* * *

The demand was for new things and better methods in horticulture.
* * *

The duty of commercial horticulturists to these stations was to ask questions. * * *

They should not ask for results too quickly. The fact that they had not been patient had led to the greatest errors. An experiment was not an experiment until it had been carried to its culmination. * * *

Commercial horticulture had a right to demand intelligent and enthusiastic laborers in these stations. * * *

We should demand that those who have charge of these stations shall select wisely and well men who are to conduct them. * * *

The work of these stations was scientific, educational, and practical. * * *

Most of the bulletins sent out by the experiment stations were not fit to read, and were cast aside by him because they contained such poor material. * * *

An experiment worker had no right to be in the station unless he started out in the beginning and said he would be honest in everything that he did or said. When that was the case he was fit for the Kingdom of Heaven. And he sometimes thought that experiment stations fitted men, if they started out with this idea, for the Kingdom of Heaven.

Prof. Dr. L. Wittmack on "Horticultural Displays at Future World's Fairs."

If ever it should be necessary to demonstrate the utility—nay, the necessity—of gardening, World's Fairs would prove it. How would the most splendid buildings look if they had no beautiful environments? A World's Fair without landscape is like a picture without a frame. * * *

Grace to the architect, grace to the landscape gardener, the Columbian World's Fair is a splendor that never has been seen before. * * *

I come to a point which in future World's Fairs should be taken into consideration. I mean the whole of Horticulture, be it for decorating purposes or exhibiting purposes, if single or collective exhibits, must lie in one hand ; there must be no division, no landscape gardening and horticulture, as here. * * *

We come to another important question—the judges. Here in Chicago has been adopted, as you all know, the principle of a single judge, who shall make a brief report of the articles that have been examined by him, and recommend an award or not. The departmental jury, his colleagues, shall then confirm or refuse his decision. It has

been said in favor of the single judge principle that a single judge will be more careful when he knows that he alone by his signature shall give the verdict. It is also said that the work will go on quicker. But I think that there is much more danger than benefit in this system. * * *

A keen judge will perhaps say "no award," another will say one award is better than none. In this way the awards may be multiplied in number and diminished in their value. * * *

In horticulture the judges have accepted the principle of a single judge, thinking it would be better to continue adopting the method in use since the month of March, when the first cyclamens were examined by the judge. I fear that this system will have bad consequences for some of the exhibitors. The jury which shall confirm the report of the single judge from March to July has not seen the articles; it must, in most cases, rely on the single judge. * * *

But for the jury in horticulture arises still another difficulty. In all other departments, members of a World's Fair jury may assemble at a given date and examine their objects, but in horticulture that has to be done all the year round; therefore a jury for horticulture should be organized at the beginning of the exposition. The president and secretary should reside in the city, or in the neighborhood of that city in which the exposition takes place, that their examinations may be continued. There should be a sufficient number of other gentlemen of that same country in which the exposition is to be held, who might assemble every fortnight, and if there are horticultural representatives of foreign countries who stay the whole time, they might also enter as judges for the whole fair. Other foreign judges may be requested to come when their specialty will be best displayed. * * *

As many exhibitors will exhibit several times, first, perhaps, lily of the valley, then roses, afterwards asters, there should be given points for each exhibition and these points added together, a certain number of points, say 100, being the standard, which must be the rate during the whole of the exhibition for getting an award. But what award? Shall there in future be only one award in the form of a medal of bronze, as here? Would it not be better to make gold, silver, and bronze medals of different grades? I think the latter way is the better, the man obtaining 100 points to receive a bronze medal, the one obtaining 200 points a silver medal, and a man obtaining 500 to 600 points a gold medal. * * *

In general I think our gardeners are accustomed to too many medals at one exposition. At horticultural exhibitions it may happen that a

man gets five or ten prizes. At industrial expositions the manufacturer gets but one medal. * * *

A gardener expects one for lily of the valley, one for syringa, and one for roses. Still, I must confess that there is a little difference between the article of the goldsmith and of the gardener, as each flower often forms a specialty. Nevertheless, I think a gardener will be more satisfied when he gets one higher medal for all these collections together, than several lower ones. * * *

A difference should be made between prizes and awards; prizes may be given each fortnight for a collection of begonias, roses, etc., but awards should only be given for the whole together at the end of the fair. * * *

As soon as the plants can be judged and the judgments confirmed, a label should be posted on the plants showing who is the owner. As it is now, the gardeners who have exhibited primroses or cyclamen in the spring and others to July, have received no benefits from their exhibits for this year; in fact, no award has been made, and it is still a secret. Gardeners might have done business if a label of award had been placed on their plants.

E. V. Hallock on "Knowledge in the Seed Trade."

The giving of credit is a matter in which great judgment should be exercised, both as to men and circumstances. The knowledge of where to find the various stocks where climatic conditions meet the requirements of the particular trade is also essential. * * *

Knowledge was also a barrier to fraud. There were men who did not care what they sold, who, as a rule, were deterred from fraud when they knew the buyer was master of his business. Foreigners used to prey upon the ignorance of buyers, but that time had passed. He wanted to warn all foreign dealers and growers that we were beyond the point where we did not know what we bought.

An Apostrophe to Flora.

Of the many gifts bestowed upon man the first and greatest of all was woman, and as she stands before us in harmonious apparel is she any the less beautiful in our eyes because of the sparkle of the diamond, the gleam of the emerald or the ruby, as their shafts of color scintillate before our eyes? Do we admire her less because of the chaste and delicate pearls which encircle her throat? I think not. To be sure, these are not necessities. Life can be sustained and enjoyed

without them ; but left to herself to choose, she instinctively adds to her personal charms by drawing upon Nature's treasure-house.—M. A. HUNT, *before Florists' Session.*

Robert Craig on "The Present of Floriculture."

Of one thing we can rest assured, as long as the love of the beautiful inheres in man, floriculture shall not lack ardent supporters. * * *

In the great rush of American life the garden offers *rest.* * * * Much has lately been written, and well written, in the leading horticultural journals, of the adornment of the spacious grounds surrounding the homes of the wealthy, but not enough in the way of suggestions as to the tasteful planting and correct culture of the smaller gardens of those not so endowed with worldly possessions ; there is not room in these little spots for extensive landscape effects ; they must be adorned in a more or less formal way, but such arrangement need not violate any principle of true art. * * *

Besides the natural style of landscape gardening there is another known as the architectural or formal ; the latter recognizes that there exists in the minds of many a love of symmetry and regularity, and the outcome is the production of formal beds in various attractive patterns, which, when the work is skillfully done, are much admired. * * *

There is another school of gardening known as the composite, which is willing to recognize merit in both of the other schools and whose present problem is to decide on the proper location and relations of illustrations of both methods, cheerfully recognizing that each is right in its own place. No less an authority than the distinguished French landscape gardener, Andrè, has recently said: "To the composite style, which results from a mingling of the other two, under favorable conditions, belongs the future of gardening art." * * * .

Some of the most gratifying exhibits at the World's Fair are the greenhouses and conservatories, which is the result of conferences between the best cultivators of plants and the greatest architects, the outcome being that the structures are beautiful from an architectural standpoint and eminently adapted to the purpose required. * * *

Another hopeful sign of the times is the interest taken in the improved varieties of outdoor bedding plants, such as roses, geraniums, carnations, verbenas, etc. This is notable in the case of the dwarf large-flowering cannas of the "Crozy" type. These latter are destined

to play a great part in the future of American gardening; they not only produce a continuation of brilliant bloom, but are also graceful in foliage and growth. * * *

The canna is a grand plant, and its improvement is yet in its infancy. Like the chrysanthemum, it is destined to grow in popularity. * * *

While outdoor gardening is receiving due attention, there was never a time when plants under glass and flowers for cutting were grown in such perfection, the improved greenhouses of to-day contributing greatly to the result. The growing interest in aquatic plants is especially noticeable; their cultivation is yearly better understood. * * *

The modern trade catalogue must not be forgotten among the agencies which advance horticulture. They are educational in a high degree, and their illustrations are faithful to nature more than at any previous time. * * *

It is to be hoped that botanical gardens will soon be established in several large cities. * * *

On the whole, the outlook is very encouraging; it is only necessary for each of us, while being diligent in our own business, to make some personal sacrifice for the public good, and to help by our sympathy and work all societies, clubs, and managers of public exhibitions in every reasonable way.

E. G. Hill on "The Future of Floriculture."

The word floriculture, strictly defined, means the culture of flowers, but each day gives to it a wider significance; it means not only the growing of plants and the production of flowers, but it also implies the artistic arrangement of both, either in the embellishment of grounds or the decoration of interiors; it implies a knowledge of the laws which govern plant life; an understanding of the soils from which they derive their sustenance; an acquaintance with their enemies and how to conquer them.

Wonderful lessons are learned by a study of plant life, if only it is studied seriously; the artist is taught *form*, *arrangement* and *color;* pendent branches, trailing vines, glossy foliage, are suggestions of value to the decorator. * * *

Floriculture has a great future in America, from the fact that the home is the center and citadel of our American civilization. The homes of the future will conserve and support our art. * * *

One of the greatest educational influences of the times is the work done by the horticultural press in so attractively leading their readers

on to a higher standard of home adornment. In addition to the plants now in general use, we shall see from year to year an increasing demand for the more purely decorative plants, such as palms, dracænas, pandanus, and crotons for interiors, while the newer trees and shrubs will attract increasing interest. * * *

Contrast the old country burying-ground with the modern cemetery, and see what landscape art and floriculture have done; and this work is only in its infancy, with a wide outlook for the future. * * *

The successful florist of the future must be an artist as well as a mere grower of plants; our profession is both an art and a science. * * *

The artistic florist will make his place a model which the average customer may safely copy, not, as now so often seen, an aggregation of glass houses, workshops, dirt piles, disorder, and anything but a place of floral beauty. * * *

Technical schools will do for floriculture what the industrial schools are doing for workers in metals, fabrics, and woods. Such institutions already have a footing in Europe, and their influence is being felt through the young men of the profession. * * *

The men who elevate their professions are invariably students, whether in or out of school, men who by research and study solve problems and make rough paths straight. * * *

There is no reason why theory and practice need be divorced in floriculture. I can do no better than quote Mr. A. Whittle's admirable words at our fourth convention: "When will the world know horticulture to be what it is—a pursuit that requires of its workers constant forethought and continual study? When gardeners themselves are willing to lift the class by the grand power of education from the rank of mere artisans, when by the careful and laborious investigation of the secrets of Nature we can advance theories and cite facts—not till then shall we have our place in the world of thought." * * *

It is estimated that the twentieth century will see over a hundred million people north of the Rio Grande; grant three-tenths of them a love for flowers, and do you see what the floriculture of the future must become? The future shall bring forth the wondrous product of the hybridizer; new varieties of plants suited to climate and requirement shall he produce. Great possibilities are in store for us in this direction; America will, in the near future, produce its Lemoine, Guillot, and Veitch.

From THE FLORISTS' EXCHANGE, *New York, September 16, 1893.*

MODERN METHODS OF THE SEED TRADE.

BY C. L. ALLEN.

THE American seed trade and the growing of seeds as an industry have made rapid progress in our country within the past sixty years. Previous to 1830 there were but few men in America that were seedsmen by profession. Some of the few had established seed houses that are still an honor to the craft and the nation; they were growers as well as sellers of seeds, and they figured largely in the development of the industry. With the growth of the country seed houses sprang up rapidly, keeping pace with other classes of business. In most cases the merchants were seed sellers rather than seedsmen; they bought and sold seeds as they would buy and sell grain, simply by name and from external appearances. There were but few men that knew varieties of other than the more common vegetables, and these men were of foreign birth, and brought with them deep-seated convictions that, while good vegetables and flowers could be grown in this country their seeds could not, and but little effort was made to produce other than those that could not be grown in Europe.

The seedsmen of that period had but few varieties to offer, and these were accepted without question or thought that there were, or might be, better ones elsewhere. Beyond the narrow limits of the cities, their suburbs, and the larger towns and villages, gardening was done on a limited scale only. But little attention was paid to luxuries, and what were considered as such then, are now regarded necessities. Such sorts as contributed to the support of life were cultivated, and the seeds from these were carefully saved for use the coming year.

The smaller towns and villages were supplied by the Shakers, who were among the first to distribute seeds throughout the country, and the quantity sold was exceedingly small. The vegetable garden was well ordered when it would furnish marrowfat peas, Mohawk beans, Wethersfield red onions, Early York and Flat Dutch cabbage, Cluster cucumber, Bush and Canada crook-neck squash, and Tuscarora corn.

In the rural districts there was but little money, and that had to meet urgent necessities, and when the garden was planted a friendly interchange of seeds among neighbors was the practice.

Contrast the past with the present and note the change! Scarcely a variety of vegetable that was then grown is now in use, and some species then unknown as vegetables are now the most generally cultivated of any in the garden. Seed-growing has become one of the most important industries we have. Our wharves and warehouses then groaned under the weight of seeds coming into this country; they now groan under the loads going out. Those who now sell seeds are, as a rule, seedsmen, and their business is conducted on that broad scale, and with the zeal and intelligence that is so prominent a feature in all our commercial transactions. They not only buy, sell, and produce, but they know what they are buying, selling, and producing. They fully understand the fundamental principles of agriculture, which includes the development by selection. They understand the causes of variation through climatic influences and conditions of soil; they know what varieties are best adapted to the various conditions that exist in this wide range of country; they know how and where the best seed is produced. The fact that a given variety is of great value in one section or locality and valueless in another not far distant, is fully understood, which enables them to provide wisely for each locality.

Herein lies the difference between the seedsman and the man who sells seed. The one sells with a full knowledge of what he is selling, and the other regardless of it. There is but one school where this knowledge can be obtained; that school is the farm or garden, and experience is the teacher. To obtain a comprehensive knowledge of seeds and plants one must become thoroughly acquainted with them; they must commence with the seed when it is put into the earth and carefully study each metamorphosis until it reproduces itself, and when we consider the vast number of varieties, each having peculiarities strictly its own, and requiring conditions suited to it, this is no easy task. To gain this knowledge seedsmen established what are called

Trial Grounds,

which are systematic plantings of everything they sell, and what is offered to them for sale, in order to test the relative and intrinsic merits of each. One of the most extensive of these we have ever visited is that of W. Atlee Burpee & Co., at Fordhook Farm.

This farm is situated near Doylestown, Bucks Co., Pa. ;—the land is rolling, mostly friable loam, underlaid with red sandstone, and intermediate in character between a heavy and light soil, the best possible for general trials, and the results will be the same as on the average farms of the country. As all varieties of soils are not to be expected on one farm, the one that is best adapted to the greatest number of varieties offers the greatest advantage for this purpose.

A visit to this farm is a rare treat to those who are fond of the beautiful in floral forms, but doubly so to those who come to study the plant as a whole. As we called, not to see, but to study methods of cultivation, and the value of what is produced, we note our observations of the objects and results of the trials made there. We take them in the order shown us, as it best illustrates the purposes and methods of Mr. Burpee ; they are as follows :—

FIRST—*Trials of all stocks of vegetable seeds a year previous to their being sent out, in order to test the quality of the product.*

This is the seedsman's sheet anchor; upon it he depends for an accurate knowledge of the quality of the seeds he sends out. The importance of this cannot be over-estimated. However careful he may be to secure the best stocks, he must of necessity depend upon the growers of all countries, and in many sections of the same country, for his supply, and, while he employs every safeguard possible, he is liable to get stocks that are unsatisfactory. This is particularly true in case of short crops, in which case the growers and wholesale dealers, anxious to fill all orders, are liable to use seeds that are not up to the highest standard. Besides that, climatic influences have much to do in changing the character of types, so that with the greatest possible care results are disappointing. On the other hand, the very best strains of seed, those that give the best satisfaction in one locality, may be worthless in another ; in both cases the seedsman will he held responsible for the results. It is therefore highly important for him to know the true character of the article he sells, and the only way to know is to prove by actual trial just what the seeds will produce. This is done at Fordhook in the most careful and systematic way. Of radishes, beets, turnips, onions, lettuce, and all other vegetable seeds that are usually sown in drills there is a row ten feet in length sown, the soil first being prepared in the best manner, and made as rich as is necessary to produce good results, not with the expectation of great results, but simply to show what the purchaser is to expect from ordinary cultivation. Each plant is allowed sufficient room for its perfect

development, and the same care is given in cultivation that is required in all well-ordered gardens. A record is kept of the date of planting, time of germination, and the conditions of the weather. When the product is ready for use, the crops are thoroughly inspected, and notes made of size, color, shape, and quality of the vegetable, and if, from any cause, there is a mixture. If the test proves satisfactory, the stock is marked for use; if the reverse, it is discarded, and that without regard to its cost. If, because of some unfavorable condition of climate, the test is not up to the standard, another year's trial is given it, the result of which is final. All vine seeds, and such as require much room, are given all they require and are put to the same severe test.

SECOND—*The testing of the leading seeds sold by competitors in the trade.*

In warfare the first duty of the general is to ascertain the strength of the enemy; and the seedsman who is awake to his interests must know just what others in the trade are offering their customers, so that if they have discovered a better variety, or a better source of supply for the same variety, he can avail himself of it. The interest now taken in horticulture has made every gardener a critic, and the seedsman who has not the best of everything will soon find himself without a clientage. Here the same care is given the competitor's stocks as with Mr. Burpee's own; as they are grown for information, they are grown as well as possible, in order that the best may be given.

In this connection is placed the seeds sold by many of the large dry-goods houses throughout the country, and the trials, to say the least, are quite amusing. These houses buy at the lowest price seeds can be put up for, and sell by the single paper at less than one-half the price a good article costs the dealer. The result shows the utter worthlessness of the seeds. Of the tests we saw, not one had a single specimen worthy of the name it bore. Yet there are always innocents enough to buy such seeds.

THIRD—*To test the quality or product of the various kinds of seeds grown in different countries.*

For the seedsman this trial is the first in importance. Upon this depends wholly his choice in the locality where he is to procure his stocks. The first thought of the seedsman is, Where can the best seeds be procured? The second is, Where can the best be procured at the lowest price? Seed-growing has become an important industry

throughout the world, and the merchant now obtains his supply not only from the extreme east and west of this country, but also from Europe, Asia, and Africa, and from the isles of the Pacific.

In common with all other business, competition is so aggressive that in order to keep trade it becomes necessary to buy cheaply—not cheap seeds—but good seeds at the lowest possible price. Formerly the growing of seeds was a profitable industry, more so than any other branch of agriculture, and the tillers of the soil in all parts of the world entered largely into it. In some countries the industry proved very successful, because all the conditions of soil and climate were favorable, and the low price of labor enabled the seed grower to produce cheaply. In these localities, there are always to be found men who are faithful to their trusts, others who are not. In order to select wisely, tests must be made of the various products. To that end the onion seed from the leading growers in California and Connecticut are placed side by side with those grown in other parts of this country and in Europe. All being grown under the same conditions, a comparative test of quality is made that guides aright when orders are placed for a supply. These tests are of immense value to the florist and market gardener, because they know when their seeds are planted just what the results will be under favorable circumstances, providing they perform well their part.

FOURTH—*To test novelties with a view to their introduction.*

The development of taste for horticulture and floriculture has created an immense demand for anything new that is offered, and every known part of the globe has been called upon to contribute from its flora to satisfy this desire. We will say here, the more rare flowers of one country are the common weeds of another. To this fact is due the introduction of some of our common weeds as "rare novelties." Let us take an instance. A few years ago some foreign seed houses introduced the *Rudbeckia* of our southern and western prairies—a troublesome weed with a very showy flower—as a rare plant, and our Government seed shop bought of it largely to distribute in States where a fine is imposed for the introduction of just such seeds. Its botanical name hid its true character from all but the few who had made plants a study.

In order to prove all things and "hold fast that which is good," every "novelty" offered is given the very best possible chance to show its usefulness, in order to know whether the patrons of this firm would be benefited or injured by its introduction. A very large proportion of the new things sent out are disappointing, not because they are not

VIEW AT FORDHOOK FARM: FIELD OF PHLOX DRUMMONDII GRANDIFLORA.

VIEW AT FORDHOOK FARM; SEED HOUSE ERECTED IN 1893.

as beautiful or useful as described, but because our climatic conditions are not favorable for their development. Hence the importance of a test, which is made decisive at Fordhook before any novelty is recommended.

FIFTH—*To grow for stock seed.*

Stock seed is the seedsman's corner-stone; his main dependence for a supply of any given variety rests wholly upon having stocks to grow from that are absolutely true to a given type. Years of constant care in selection are necessary to produce a type, and if the same care that was given to procure a type is not employed to preserve it deterioration will soon result. It is highly important, too, to do this work where the variety will, with good cultivation, remain true to type. The best directed efforts in this work are useless if the natural conditions of soil and climate are unfavorable. The casual observer has not the slightest appreciation of this work, nor is aware of the amount of labor and constant watchfulness required to keep any type up to a high standard. Each variety must be grown so far from any allied sort that cross fertilization is out of the question. No two varieties of any of the cereals can be safely grown on the same farm, as cross fertilization may occur through the agency of the winds. Vines will suffer in as great a degree through insect visits.

The growing of stock seed is systematically carried on at Fordhook. Several small plantings, say one acre each, of a new white cucumber were noticed; these were so far apart that an accident to one would not in any way affect another. These are watched with the greatest care to detect any variation in form or color; should the slightest appear, the plant is at once discarded. And, for this purpose, no plant of any kind is allowed to remain if it has on it any poor specimen of fruits. We cannot go into the detail of this work, but will say that every variety grown in this country for seed purposes is given the same care as the one noticed, which will show the extent of this important work.

SIXTH—*The growing of choice annuals for seed purposes.*

The growing of flower seeds is not carried on to any great extent in this country, because of the high price of labor. But there are some things, such as balsams, salvias, zinnias, mignonette, and petunias, that, because the adulteration of seeds is such a common practice, it is necessary for the seedsman to have these grown under his own personal supervision. Of course, all the cheaper grades are imported, but

such as the amateur and florist requires must needs be beyond question as to purity, quality, and germinating power. To see the best sorts grown with care, where each plant has sufficient room for development and an abundant supply of plant food, is to be convinced that what are often considered overdrawn illustrations are practically truthful.

SEVENTH — *Development by selection.*

There is a natural tendency in plants to "sport"—that is, to assume some new character, either as regards size, color, or vigor. These sports are quite likely to remain constant, but they must be tried thoroughly, and as they appear in each case singly, before there is sufficient stock for purposes of sale, there is sufficient opportunity. But the utmost care must be given them to establish a new type, and a constant watch kept to see if there is no further variation. If, in three or four generations, the type becomes established, a new variety is secured, and it is offered to the public.

In this department the work of cross fertilization is carried on, which is simply uniting the good qualities of two varieties into one, as in the flower combining the color of one flower with the size or shape of another; and, too, the flower of a weak plant is introduced to the plant that is vigorous, but with poor flowers. Also, in the vegetable, to unite the esculent properties of the one with the productive properties of the other. After the cross has been effected, the work of selection commences. If the cross has been effectual, there will be as many varieties as there are seeds in the capsules, as such as are worthy of perpetuation are chosen and grown on from year to year, always discarding the undesirable, until finally the desired character has been secured.

This is the work of the specialist, and it will be valuable just in proportion to the care given. The casual visitor at Fordhook will not see this, because the inventor never shows his work until it is complete, but it is to be found there, going on in a quiet but effective manner.

EIGHTH—*Educational.*

In any business as large as that of the modern seedsman it is necessary to have a large number of reliable young men so educated that they will be capable to fill the highest position in the business. An ordinary clerk in a seed store rarely knows anything about what he sells; his operations are mechanical, but there must needs be some

one in each department who is perfectly familiar with all the details of the business. This requires a large force, and to be fitted for the work they must graduate from the trial farm, where they have studied the plant, its habits, and requirements; they must know *it*, not about it. The well-ordered trial farm is the curriculum for any young man who wishes to become familiar with every department of horticulture. In one year he will learn more here than during a lifetime in college. By this means Mr. Burpee is enabled to secure an intelligent, well-organized force for the detail of his business.

NINTH—*Testing the vitality of seeds.*

The testing of seeds to show their germinating properties before sending out is a practice of vital importance to seedsmen, and one that is but seldom systematically practiced. The germinating power of seeds is very variable; some varieties must be sown as soon as ripe or they will not reproduce the species, as they quickly lose their vitality. Others will retain their germinating powers for a period of ten or more years, while it is safe to depend upon most seeds for from three to five years. But because seeds on an average retain their vitality for a period of four years when grown and secured under favorable circumstances, it does not follow that it is safe to sell or plant any seed until a test has been made. There are many latent defects in seeds arising from causes but little understood; these can only be revealed by the crucial test of a germinating bench, where all seeds are tested before being put up in packets for sending out.

Many seeds may lose their vitality without any marked change in external appearance, a fact that has enabled unscrupulous dealers to adulterate with seeds that have lost their vitality through age, or by mixing with seeds of the same genus that have been purposely treated to destroy vitality. This practice has been carried on to a very great extent, but it is no longer available where thorough tests of germination are made.

Another very important object in making these tests is to guard against unjust complaints from the buyers. Seeds often fail to grow because proper care in sowing has not been given; too deep planting is often a cause of failure, and planting in soils not properly prepared is a more frequent cause. We have often seen large sowings destroyed by heavy rains falling just before the young plants were ready to break forth; these rains packed the soil so hard when it became dried by the sun the germs had not sufficient strength to break through, and failure was the result. Failure to germinate, no matter

from what cause, is generally attributed to the seed, and these complaints are of such frequent occurrence that tests in order to prove the vitality of seeds are absolutely necessary. They avoid great difficulty, because the seedsman knows that it is not the fault of the seed, and in almost every case he can convince his customer that loss came from improper care in sowing, or from unfavorable climatic conditions.

These tests are systematically carried on at Fordhook, where greenhouses that can be kept at the proper temperature are provided for this purpose. Herein are sown seeds of all kinds and of all ages, in drills four inches apart, one hundred seeds of a kind in a drill, and covered from one-eighth to one-half an inch in depth, according to the size of the seed. A careful record is made of each sowing, as to date, age, and grower of the seed. These sowings have the most constant attention in order to note the progress of germination, as it is quite as important to the market gardener to have the seed come regularly as it is to have a large percentage of germination. Providing the sample tested is all of the same season's growth, there is no better evidence of a well-selected strain than to have an even germination. It is important to the seedsman as well, for it shows plainly whether the grower has mixed the old with the new crop, in which case the stock would be returned to the grower. The watchful care of Mr. Burpee in this direction is one of the many safeguards he throws around his business. Although expensive, it is in the end cheap insurance and a most valuable auxiliary.

From the PUBLIC LEDGER, *Philadelphia, Tuesday, September 19, 1893.*

FARM AND GARDEN.

AUTUMN'S GLORY.

"How shall I crown this child?" fair Summer said:
"May wasted all her violets long ago;
No longer on the hills June's roses glow,
Flushing with tender bloom the pastures wide;
My stately lilies one by one have died;
The clematis is but a ghost, and lo!
In the fair meadow lands no daisies blow.
How shall I crown this summer child?" she sighed,
Then quickly smiled: "For him, for him," she said,
"On every hill my golden rod shall flame,
Token of all my prescient soul foretells:
His shall be golden song and golden fame,
Long golden years with love and honor wed,
And crowns at last of silver immortelles."

—J. C. R. DORR.

THE business of the month is the seed for next season's growing. Some grow their own seed, and such have had next season's needs in mind since the growth of this year began. Like produces like, they say. And whatever they have grown or have seen growing that was worth reproducing they have marked as to be saved for seeding. Some have even gone further and have made note of special features, either of growth, time of maturing, flavor, etc., and have already an interest in the next year's work in the anticipation that the promise will be fulfilled.

Those who do not grow their seeds, but make a list each year for the seedsman to fill, are sometimes so far thoughtful as to inquire where these seeds were grown and to find out the care that is taken to prove them good. Seed growing is an exceedingly interesting matter, but not more so than are the methods seedsmen take to protect their good name; that is, to provide good seed and the proof that it is so. One can judge fairly well of grains and tubers, but of vegetable and flower

seeds a very fair semblance to the uninitiated may be worthless as chaff.

It was to find out about it that Fordhook Farm, W. Atlee Burpee's place at Doylestown, was visited. The first knowledge gained was that seed is grown where the conditions of climate, soil, etc., are best suited to its peculiar needs, and whefe best results can be obtained. Thus lettuce seed is grown in California, cucumber seed in central New York, cauliflower in Denmark, cabbage between the sound and ocean on Long Island, beans, peas, and turnip seed in New York and Canada, watermelon in Florida, okra and egg-plant in Georgia, musk-melon in New Jersey, potatoes and tomatoes in this vicinity. Seed is furnished to such growers in each vicinity as have the location and facilities for turning out best results. More than this, other sorts of many of the varieties must not be grown in the near vicinity, lest the pollen shall be carried by bees or the wind, and undesirable crosses result.

When the seeds are delivered and while yet in bulk a sample is taken for the two tests of vitality and purity. For vitality they are sown in frames, and the time of germinating and the character of the first growth noted. If up to the standard, the seeds are endorsed and accepted. If questionable, a second trial is given, when, if the result is not entirely satisfactory, the package is closed again and returned to the grower. This test is a matter of a few days only, whereas the test for purity is a whole season's work. For this every variety of seed is numbered, and a sample is sown between two stakes, bearing the same numbers, and an entry giving every particular concerning the seed is made in the purity book against the same number. As a rule, the seeds grown from the plants in this test are not saved, but a very close watch is kept of every growth, and when anything appears that is new or strange or especially desirable a string is tied about it or a tall stake is driven beside it and the seed is gathered for experimenting.

Certain seeds, as black Lima beans, tomato, mignonette, verbena, and petunia are grown. Where the seeds have only to be threshed out, the plants are cut close to the earth and brought to the seed-house in sheets, each variety by itself, and on these sheets are exposed to the air and sun until perfectly cured, when they are threshed with a flail, cleaned by machine, tested for vitality, and, if satisfactory, sent to the storehouse for marketing.

Tomato seed is saved by crushing the fruit in vats of water and leaving it to ferment, when the seeds drop to the bottom. The pulp is then run off and the seeds are washed, drained, and dried. At Ford-

hook Farm the pulp from the vat is washed into a small pond. The ducks on the farm found out about it and left their own swimming place for it, and whenever the fermenting pulp was washed away would become grossly intoxicated. Gradually these ducks began to lose in condition, and a post-mortem examination proved a temperance lecture, in that the digestive organs were badly worsted by the fermented liquor, and in some of the birds were almost destroyed.

The tool-house of Fordhook Farm holds a suggestion. Every tool that can be needed is provided. Each one is numbered, and the number is that of the section in the house where they belong when not in use, and of the workman who may use those of the number and no others. If the section is empty or the tools are found lying about, it is easy to place the blame, and one who is careless with tools is considered to be careless in other matters, and is not wanted.

Mr. Darlington, the superintendent at Fordhook Farm, confirms the statement made in the *Ledger* a few weeks back that plants produced from the seeds of unripe tomatoes were earlier in ripening the fruit, but adds that the vitality of the plant is less. The Director of the New York Experiment Station gives as a reason for the earlier ripening the scant foliage usual to the plant from unripened seeds being but little obstructive to the sunlight, the fruit being exposed at all times. Another experiment in which he was interested was with the seeds of large and small tomatoes from the same plant. The seed from the small fruits produced plants of but medium vigor and productiveness, but the fruit was as large as that from the large fruit, and very much earlier. The latter's plants were more vigorous and productive, but the fruit was ten days later.

At Fordhook, as soon as a patch is cleared, whether of flowers or vegetables, it is sown to clover, to be plowed under the next spring.

From THE DAILY DEMOCRAT, *Doylestown, Pa., Thursday, September 7, 1893.*

CARPENTERS AT FORDHOOK.

MANY IMPROVEMENTS BEING MADE AT THE FARM—W. ATLEE BURPEE & COMPANY'S NEW SEED HOUSE.

THE sound of the hammer is echoing about Fordhook farm just now. The finishing touches to a great number of improvements are being made. The most important is the big seed-drying house about completed. The late Henry D. Livezey erected the building. . . .

A hasty glance at the exterior of the building would not convey an idea of its merits, but close inspection shows that it has been carefully planned and built. The timbers are large and heavy. Light, ventilation, and convenience have all been obtained. . . . A magnificent view of the hills and valleys about Fordhook can be obtained from the cupola, wherein a big bell will be hung to sound the hours for beginning and quitting work.

A complete tool room occupies a portion of the first floor. Here are also the seed drawers, seed-cleaning room, sheet room, and the tables for sorting and cleaning the various seeds, which are dried upon sheets. The proprietor does not believe in artificial heat for drying purposes, claiming that it has a tendency to destroy the germinating properties of the seeds. Great care and work were necessary in the construction of the tables. Mr. Burpee has minute, dust-like seed, worth its weight in gold, and cracks in the tables would allow many a dollar to slip away.

The bean-sorting tables are under chutes connecting with bins on the floor above. A metallic attachment regulates the supply wanted by the person engaged in sorting the good seed from the bad. The seed will be threshed with the old-fashioned flail, which requires high ceilings in the room where the work will be done. Through the center of the building is an open driveway and upon one side of the passage is located the elevator for hoisting and lowering crops in bulk. All seeds will be brought to this building to be dried and cured. In the cellars, which have smooth cement floors, potatoes will be stored.

VIEW AT FORDHOOK FARM: TRIALS OF BUSH BEANS.

VIEW AT FORDHOOK FARM: TRIALS OF FLOWERS.

Mr. Burpee is endeavoring to interest local farmers in the matter of growing seeds, and his systematic and carefully devised methods for their culture offer valuable suggestions to every farmer desirous of engaging in the business. In addition to other improvements there are three new poultry houses on the farm as complete as those described in the *Democrat* upon previous occasions.

New stables have been built in the barn, being made of hard wood. Additional windows of the French pattern have been let into the walls. In the cow stables cement floors with big gutters for flushing have been laid down. Sunlight and fresh air, economy in room, time, and labor have all had their influence in the creation of the plans for improvements and repairs.

Howard M. Earl, manager, states that the Burpee trial grounds are planted with more than 5200 samples of seed this season. Mr. Earl has recently returned from Europe and after inspecting the famous trial grounds abroad, is satisfied that Fordhook will compare favorably with any in the world. In fact, the business at the farm has so increased that facilities were fast becoming inadequate, and the changes made have been a matter of necessity.

New ventures are being made, and two new greenhouses, each 100 feet long, will be erected this year, wherein will be propagated seeds and plants hitherto brought from Europe, including double petunias, gloxinias, etc. Mr. Burpee hopes to get better results by keeping everything under his own eye. The work in the building known as the office is also increasing, and the structure will hereafter be used exclusively for clerical work.

Though Fordhook is a beautiful place to visit, where one can see evidences of thousands of dollars having been already expended, the owner is not yet content to rest, and is planning future improvements to be as substantial and commodious as those recently created.

* *From* THE PHILADELPHIA INQUIRER, *October 8, 1893.*

A VISIT TO BEAUTIFUL

"FORDHOOK"

Among the Bucks County Hills.

A BEWILDERING VARIETY OF GORGEOUS BLOSSOMS AND USEFUL PLANTS.

How W. Atlee Burpee & Co. Have Developed All the Scientific and Artistic Possibilities Wrapped Up in Seeds—Trial Grounds and Their Uses—The Cleaning and Distribution of Seeds—New Varieties, How They Originate.

SOME one of the old philosophers has said that the man who makes two plants grow where there was previously but one is a benefactor of the human race. In that case, what shall we say of the man who makes many hundreds and thousands of plants grow where there was previously none at all? This latter is what the professional seed-growers of the country are doing every year.

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* The article, "WHERE AND HOW SEEDS ARE GROWN," first appeared with illustrations in THE PHILADELPHIA INQUIRER, one of the oldest and best daily papers in America (established 1829). In our FARM ANNUAL for 1893, owing to lack of space, considerable of this article was omitted; we now give it complete and trust that, aided by the bright pictures from photographs, it will enable our friends and customers everywhere to look, through the eyes of the INQUIRER representative, upon work and results for which our time and capital are so freely given.—W. A. B. & CO.

The growing of seeds has come to be a science, the immensity and value of which is but little realized among the general public. It has come to be numbered among the leading industries of the United States, and thousands of acres are given over annually to the production of the tiny germs whose subsequent activity and development are to delight the palate and gratify the senses of sight and smell of millions of people. Vegetable and flower seeds are more particularly included in this generalization, as it is in these that the average citizen with no special agricultural learning feels the most personal interest.

As may be imagined, the southeastern corner of Pennsylvania, with its rich, sunny fields and hillsides, one of the true garden spots of the country, has proven an attractive field to seed-growers, and there are in the immediate vicinity of Philadelphia a number of extensive seed farms, which are, if people were generally aware of it, centers of the deepest interest, and scenes of some of the most amazing scientific and natural processes that can be conceived.

A Model Seed Farm.

One of the largest, and at the same time most accessible and most finely located of these, is beautiful "Fordhook," the producing and testing center of W. Atlee Burpee & Co., which lies among the green hills of Bucks County, just outside the quiet, umbrageous little county-seat, Doylestown. Here the personal management and scientific skill of Mr. Burpee, the firm's head, has built up a veritable model seed farm, and as his generosity throws the gates open to visitors at all times, one can here wander through acre after acre of infinite varieties of pretty much all that old Mother Nature produces in the way of luscious vegetables and lovely flowers. An INQUIRER representative, who recently spent an entire day in tramping over the ground in company with Manager H. M. Earl, secured a most interesting and enjoyable revelation of many of the mysteries of nature's laboratory, together with the wonderful effects produced by the refining, cultivating influence of man's hand when he assists those same mysteries in their inception and development.

The first glimpse of "Fordhook" which the visitor obtains is a sudden flash of glorious color in the morning landscape just before the Reading Railroad train rolls into Doylestown depot. Acres of bright crimson scarlet sage and vari-hued balsam, mingling with the innumerable tints of thousands of other flowers and the varying shades of soft green of the vegetable plots, form a striking picture which is a fit prelude to the detailed inspection of the scene to come. At the depot a

buckboard is in waiting, and we are soon speeding over a hard, dry macadamized road, behind one of the big, sleek, plump "Fordhook" horses, and being put thoroughly at ease by Manager Earl, who handles the reins; for courtesy is one of the prevailing characteristics at "Fordhook," and the visitor finds everywhere a delightful hospitality and attention, from the genial head of the firm down to the workers in the fields.

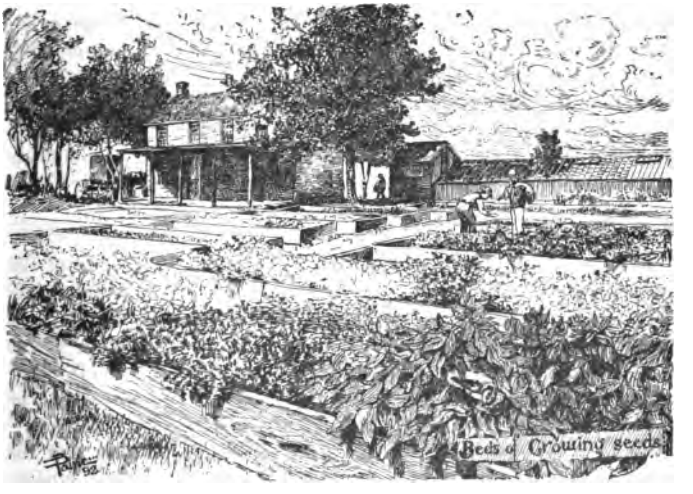
A Delightful Section of Country.

The northeast portion of the farm lying nearest Doylestown is a beautiful, shady piece of woodland, which, in spite of the value of every rod of ground for growing purposes, Mr. Burpee is determined shall always remain woodland. At the western entrance to the farm stands "The Cottage," the trim, neat summer residence of Mr. Burpee and his family, surrounded by sloping lawns studded with beds of bright flowers, and looking out across a magnificent stretch of green valleys and far-away blue hills to the south. Not far away is a little two-story structure, where is located the office, and this is the best point from which to start off and "do" the farm. Close at hand are the greenhouses used for starting early, tender seed, such as tomatoes and peppers in the spring, and alongside of these are rows of frames, where the young seedlings are ushered off, and given their first start in life before being transplanted to the open fields.

Down the southward slope from the office, where they will get the full effects of the sun, are acre after acre of the humble but succulent bean, for the growing of which the Burpee house has a great reputation, especially in the production of new varieties. Many new forms are tried every year, and many sample packages of seed are distributed free in every section of the country, in order that reports may be obtained as to availability and growth, and a widespread judgment secured. However homely the subject, a field of beans is a picturesque sight when seen as here, where the rows are planted with the most mathematical accuracy, four feet apart each way. In the midst of the pole beans is seen an interesting instance of the methods adopted to secure purity of stock. There is a sudden break in the beans, and the gap is filled in with two rows of a new variety of sweet corn which is being tested, and which is thus isolated among the beans to prevent it being vitiated or affected by any other varieties of corn in the vicinity. Corn requires great care in this respect, as the light pollen is carried to extraordinary distances by the wind, resulting in the hybridization of the original stocks.

Some Wonderful Balsams.

A field of bright-hued balsams next claims attention. One of the striking peculiarities of "Fordhook" is the manner in which the old-time simple flowers of our grandmothers' gardens have been refined, and by diligent, painstaking selection and cross-fertilization developed into the most gorgeous and beautiful blooms imaginable. This is particularly the case with balsams, which are made the subject of special care and pride by Mr. Burpee and his assistants. One can hardly realize that these magnificent flowers which are here seen massed by the acre are developed from the old familiar lady-slipper. They are of



every imaginable hue and tint, from gaudy scarlet and purple to a delicate rose-pink, and they are fully as double as roses.

Mr. Burpee claims that "Fordhook" presents the finest stock of balsams in the world, and certainly one can imagine nothing to excel the display which here feasts the eye. Close at hand are beds of very rich, red, tulip-colored poppies, which, like most of the floral novelties tested at "Fordhook," come from across the water. "Europe," says Mr. Earl, "is the fountain-head of flowers; we are constantly receiving and testing varieties from there. The growers and hybridizers in the old countries have great advantage over us in taste and experience."

In spite of which, however, it is hard to conceive of any higher development of taste and beauty than we see in the flower-beds in all parts of "Fordhook."

A great blaze of warm, deep crimson color tells us we have reached the principal beds of Salvia splendens, or scarlet sage, which is a conspicuous flower in numerous parts of the farm and which gives a strong, ruddy dash of color to every spot in which it penetrates. Scarlet sage has probably never before been seen in such a high state of development as it has reached here. It is much improved in habit of growth and the plants are more compact than the scarlet sage of the old-fashioned garden. Here is noticed a curious instance of what the gardeners and growers call a "sport," or erratic deviation from the original stock. This is nothing less than a white scarlet sage, or, in other words, one that is not scarlet at all, but pure white, growing directly in the midst of the thousands of deep-colored flowers. The seed from this "sport" will be carefully saved and planted next year in an isolated position, and may result in the development of a new, white variety. It is in this way that many of the most valuable new varieties of both vegetables and flowers are obtained.

Some Valuable Seed.

Large plots of petunias close at hand flaunt their rich colors in the autumn breeze. Mr. Burpee has spent much care upon petunias, and has a special strain called "Defiance," which bear the most gorgeous blossoms imaginable, of all colors, and of wonderful size, many of the flowers being three, four, and even five inches across. It is an interesting fact that the higher the state of refinement a flower reaches, the scarcer is its seed, and this is well shown in this very "Defiance" petunia, whose seed is so rare that it is worth $50 per ounce, and the entire product of seed from an acre of flowers is but a few ounces; common petunias produce from forty to fifty pounds of seed to the acre, and it brings from $4 per pound up.

New and Interesting Varieties.

The visitor is everywhere surprised by some new and interesting novelty literally cropping up from under his very feet as he traverses "Fordhook." Here, for instance, we strike a funny little wrinkled pepper, which comes all the way from South America, and which has a taste as distinctly fiery as the hot-headed nations of the Southern republics. A few steps further on we come to another of Mr. Burpee's pets, a curious dwarf bean, known as Burpee's bush lima, which holds

itself in the air without the assistance of a pole, and which bears delicious, big, sweet beans, looking good enough to eat raw. This variety has a curious history. A Chester County farmer one year planted a number of ordinary pole lima beans, which voracious cut-worms promptly destroyed as soon as they had attained a good growth. Among the wreck was found a "sport" in the shape of a dwarf bean, which took on itself bushy characteristics, and ignored the poles. The farmer took care of it, sent the seed to "Fordhook," and, by skill, science, and industry Mr. Burpee succeeded in maintaining the present valuable form. This bush bean is considered by growers everywhere to be one of the greatest horticultural achievements of the age. The bean is a peculiar plant, according to the experience at Fordhook. For instance, not long ago, thirty varieties which were sent up from Lima, Peru, the home of the vegetable, were thoroughly tested in the farm's trial grounds, and not one was found to be of practical value.

Cockscomb and Sage.

More flowers come into view, the arrangements at the farm involving a delightful and novel alternation of vegetables and flowers, which has not only its esthetic side to the visitor, but also its utilitarian side to the grower, as it is a precaution against mixing by cross-fertilization of allied varieties in either class. Here we find a massive stretch of Celosia, which is cockscomb, and yet which is not cockscomb in the old-fashioned sense, for these magnificent, velvety flowers, of rich ruby-crimson, low of growth, and forming splendid, compact clusters, would have been a revelation to our ancestors. In brilliant contrast is a large patch of Salvia patens, or blue sage, which presents the richest blue of any flower known. This is a very delicate plant in Europe, and needs tender care in greenhouses, but it grows luxuriantly and hardily enough out in the open fields here at Fordhook. The next plot of vegetables includes an unique climbing cucumber, of Japanese origin, and a little further on is a large patch of a pure white cucumber, which is notable from the fact that it contains none of the peculiar sharp taste which the skin communicates to the common green variety. We here see a special variety of sweet corn, which is the result of four or five years of careful hybridization.

The grain is very deep, and the cob shows up comparatively small when the ear is broken across. We skirt around a field of beautiful, feathery asparagus, which will be sending up succulent shoots next spring, and strike into several acres of tomatoes, among which is a peculiar pear-shaped variety. Tomatoes are one of the bugbears of the

grower's life. Hundreds of new varieties are coming out all the time, and all of these which give any promise of good qualities are conscientiously tested at "Fordhook," often with the most discouraging results. The qualifications of a good tomato are uniformity of color, as few seeds as possible, and lack of tendency to crack when ripening, and the last seems the hardest to fulfill. Here we chance upon a curious little tomato, known as the husk tomato, and which is the old "ground cherry" revived; it is about the size and shape of a hickory nut, and its only use is for preserving.

Another big field of beans is encountered, and here we strike the

Seed Curing.

Sunshine Wax, which is of a beautiful golden yellow, and is regarded as the highest type of string bean. Like the bush lima this also had an interesting origin, being derived from a "sport" in the fields of an old Long Island farmer.

Among Lovely Flowers.

Two acres of mixed phlox form an attractive picture, these beautiful flowers being another of Mr. Burpee's particular favorities. Not far from the phlox patch is found an interesting balsam "sport," with beautifully striped and blotched petals. This bears a distinctive number, and is classified upon the farm's books by the patch in which it

grows and other characteristics which go to make up a flower's pedigree. Much of Mr. Burpee's success in obtaining such magnificent varieties of plants is due to this principle of selecting and growing only the finest specimens, breeding them as carefully as blooded animals are bred, and keeping a regular plant pedigree.

Among the many beautiful flowers we here see a bed of dwarf fire ball zinnia, and near at hand a mass of the curiously beautiful giant spider plant, whose seed-pods, quivering on the ends of slender stipules, present a startling resemblance to the extended legs of an immense spider, with the corolla of the flower in the center as a body. Then here is the royal purple balsam, which is a single flower across the water, but which at "Fordhook" is beautifully double, and causes foreign visitors to open their eyes in consequence. Two acres of splendid mignonette were, a few weeks back, scenting the air sweetly for yards around, but the cold nights have now nipped these, and their seed is already in process of drying. Some other balsams are met here, known as the camellia flowered, and which are ranked next to the "Defiance" strain. The "Daisy Miller" is a beautiful flower, pure white in color, with a most marvelously delicate lavender-tinged center, while the "Perfection" is spotlessly white, and is much used by florists for wire work. An unique and pretty variety of phlox is streaked like a star and handsomely fringed around the edges of the petals. A couple of interesting vegetable "sports" are the Golden Queen tomato, which is a beautiful yellow color and of delicious flavor, and some monstrous peppers, six and eight inches long, of divers shapes. A hardy-looking patch of strawberry plants is, we are told, the Parker Earle, named after the president of a Western horticultural society, and which, besides possessing a fine flavor, has roots which go deep into the ground and defy upheaving frosts.

The Trial Grounds.

One of the ruling principles of "Fordhook" is to experiment all things, then retain and develop the best. The work of experimenting with the qualities of hundreds of varieties of growing things is one of the most interesting and important features of the farm. The trial grounds occupy between five and six acres upon the eastern side, and the average visitor who has a liking for the beautiful in nature or for the innermost science of horticulture would gladly spend an entire day here. Before taking a hasty glance at the trial grounds it is necessary to say something about how original stocks are obtained by Mr. Burpee. It has been found that different seeds ripen and mature best

in different sections of the country, or in different countries, slight distinctions of soil or climate having an immense influence on the proper development of plants. For this reason many of the Burpee seeds are the product of special growers located in various States or in various foreign countries. Thus it has been found that peas and beans mature best in the northwestern part of New York and the adjoining region of Canada; vine seeds, such as watermelons, do best in the damp, rich soil of Florida; muskmelons, cucumbers, and squashes in New Jersey and Nebraska; egg-plants in New Jersey and Georgia; tomatoes in Pennsylvania and Ohio; radish seed mostly comes from France. A large number of flower seeds and the large, mild onions come from Italy, and flowers of novel forms and hues are always being produced by almost every European country excepting Russia; almost all the cabbage seed grown in this country comes from Bucks county, Pennsylvania, and Long Island, and the best cauliflower seed from Denmark; lettuce seed gets its best growth in California; in fact, the sub-tropical climate of portions of this latter State has proven excellent for many kinds of seeds which formerly had to be imported from abroad.

Seeds From all Over the Globe.

"Fordhook" farm, therefore, gets seed from all over the globe, even from such out-of-the-way countries as Russia and China, besides constantly receiving large quantities from the firm's own growers in different parts of the United States, and samples of the principal introductions of rival seedsmen from everywhere. All these seeds are carefully tested as to their growth and general qualities, and compared with one another in order that the very best may always be determined upon. It is for the making of these tests that the trial grounds are used. The grounds are divided up into thousands of little, regular, oblong patches, in each of which is sown one kind of seed only. No extra fertilization or extraordinary cultivation is used upon these patches, care being taken that all seeds shall germinate and grow under precisely the same conditions as they would find in the fields of the average American farmer. Not only are all outside seeds tested here, but every one of the Burpee firm's own seeds are subjected to precisely the same conditions, in order not only that every comparison may be made, but that the standard of their own seed may not be allowed to fall.

In addition to these tests, precautions are taken by sending out skilled inspectors to see that all crops grown for Burpee are first-class in every respect.

A Novel Set of Books.

The record of results attained in the trial grounds is a most interesting feature. This record is kept in a set of registry books stored in the office of the farm. Each plot of the grounds bears a number, and these numbers are entered upon the books, with all the characteristics of the various plants carefully noted opposite them as the season advances. The amount of clerical labor to be done in keeping this novel set of books can be estimated when it is known that during the season just ending there have been 3000 varieties of vegetable seeds, and 1240 varieties of flower seeds tested in the trial beds.* To show something of the endless profusion of seeds handled it may be stated that of these 4240 varieties there were 372 samples of beans, 176 of cabbages, 40 beets, 93 of sweet corn, 74 cucumbers, 88 of lettuce, 84 muskmelons, 110 watermelons, 86 onions, 102 peas, 53 peppers, 45 potatoes, 45 pumpkins, 73 radishes, 108 squashes, 26 of tobacco, and 118 tomatoes; among the flowers there were 70 varieties of balsams, 131 asters, 44 poppies, 86 pansies, 33 petunias, 61 sweet peas, 27 scabiosas, and 24 nasturtiums. Of course these are simply the leading species among hundreds here represented.

The very first test is not made in the trial grounds, but in the greenhouse frames, where the seeds are examined as to their vitality, the latter involving consideration of the length of time they lie in the ground, when they germinate, and the rapidity of their growth, the results being noted down on a basis of percentage.

A few hours' walk through the several thousand trial beds is full of interest and enjoyment, but it would take weeks and months spent assiduously here to learn one-half of the interesting things to be learned, or to see one-half the beauties which are displayed at every turn.

The Coming Flower.

Not far away are the plots of sweet peas, which call for special mention, not only on account of the magnificence to which these lovely

* As will be seen, the total of trials for the season of 1892 was 4220. For the past season of 1893, our books show 2883 trials of VEGETABLE SEEDS and 2426 trials of FLOWER SEEDS, a total of 5309. The following details will show something of the scope covered by these trials:—In VEGETABLES: Beans, 351 trials; Beets, 73; Cabbage, 236; Sweet Corn, 195; Lettuce, 177; Melons, 227; Onions, 131; Peas, 155; Potatoes, 60; Radishes, 145; Tomatoes, 131; Grass, 106, etc. Some of the leading items in FLOWER SEEDS are—Pansies, 230 trials; Sweet Peas, 137; Asters, 337; Balsams, 107; Ipomœa, 17; Nasturtium and Tropæolum, 60; Poppies, 87; Scabiosa, 53; Stocks, 97; Verbena, 30; Zinnia, 34, etc.—W. A. B. & Co.

flowers have here been brought, but also because of the importance which they promise to assume in the ornamental gardening of the near future. Mr. Burpee thinks that the sweet pea has never received the consideration from horticulturists and flower lovers to which it is entitled, and he considers it the flower of the future. The improvements made in sweet peas by hybridization and high cultivation are greater than in the case of any other annual flower, excepting pansies. The fact that their beauty is beginning to impress the world at large is shown by the fact that contracts for furnishing sweet pea seeds have already been made for the coming season aggregating over 12,000 pounds. By his efforts to improve and make more popular this lovely flower, Mr. Burpee has undoubtedly made his house the headquarters for them. The trial beds show many beautiful varieties of every imaginable hue. Of pansies, too, there are hosts of fine and rare kinds, all brought to a high state of perfection, and that they are popular is best demonstrated by the fact that more than 250,000 packages of pansy seeds were sold by W. Atlee Burpee & Co. last season.

Varieties Being Tested.

Among the many interesting and beautiful things which the trial beds reveal, and can, unfortunately, be but barely touched upon, there is the curious yard-long bean, the Willow-leaf Lima, which has beautiful slender foliage, entirely suitable for ornamental purposes, and at the same time bears an enormous crop of succulent beans; gorgeous beds of celosia, among which a magnificent new French variety, "Triumph of the Exposition," is particularly noticeable; balsams without number and without limitation as to shades and colors, and many beds of brilliant dianthus and carnations. There seem to be endless varieties of tomatoes on trial, and one of the best, which is known as the "Dwarf Champion," is of particular interest to horticulturists, owing to the fact that it has the commendable faculty of keeping itself within respectable bounds, and not spreading over too much territory; the "Matchless" is another of the very few really good varieties shown here. A curious freak of nature is the peach tomato, which looks for all the world like a ripe, luscious freestone from sandy Delaware. There are a number of samples from abroad on trial, including a straw-white variety, but they have been found to be comparatively worthless, and as the manager sententiously remarks, "America leads the world in tomatoes."

Bed after bed is given over to squashes, and they assume every imaginable shape and size, one of the most peculiar being the Der Wing, from China, which is covered all over the surface with warts. The

leading squash here has the honor of bearing "Fordhook" as its title and represents the acme of cultivation and refinement in this line.

Unique Blossoms.

Among the brilliant plots of phlox a novelty is the Starred and Fringed variety, and among the petunias we are shown a handsome specimen with unique, green-margined petals. Here is a most wonderful display of gladioli, with spikes of gorgeous blooms several feet long and presenting all the rainbow colors. The dahlias at "Fordhook" are all grown from seed, instead of roots, a recent introduction which has proven immensely successful. Row after row of varicolored asters delight the eye with a wealth of tints, and flaring marigolds bend gracefully toward the sun, one of the most beautiful being the lemon quilled, which is a bright yellow. Here, too, are grown direct from the seed the most brilliant coleus and verbenas. Cosmos, which is a Mexican plant in several colors, forms an attractive display, and we can well believe the assertion that this flower is considered by florists to be an exceedingly high type of beauty.

It will be seen that these trial beds occupy the position of a huge open book, in which can be read at all times the qualities of any particular kind of plant, and in which all faults, as well as all merits and beauties, are written by nature's inflexible hand. From these beds have sprung many important novelties. Among the valuable vegetables which W. Atlee Burpee & Co. have introduced are the Ironclad and Cuban Queen watermelons, Emerald Gem and Montreal muskmelons, Ruby King pepper, Silver King and Victoria onions, Surehead cabbage, which is a late variety, and Allhead cabbage, which is early; Empire State and Burpee's Extra Early potatoes, Saddleback Wax and Burpee's Bush Lima beans, Turner Hybrid tomato, Breadstone turnip, and several different forms of peas, besides Welcome oats and other farm seeds, all of which have stood the tests of time and wide experience, and have proven decided additions to the standard planting stock of the country.

Preparing the Seed.

Of course, one of the all-important divisions of the work at "Fordhook" is the preparation of the seeds after they have been grown and gathered. This is a labor that requires the utmost care and deftness, and, indeed, when the average visitor notes the minute, almost microscopic, size of many of the flower seeds, he is inclined to wonder that it is possible to save any of them at all. But the work has been reduced to a science here, and skilled workmen turn out the cleanest and purest seed that could possibly be obtained.

Seeds in pods, such as balsam, are first run through an ingenious apparatus in which a grooved wheel crushes the dried pods, allowing the heavy seed to drop out, dust and debris then being removed by means of a sieve. In fact, the sieve and the fan are the principal means of cleaning the bulk of seeds. The separation of the seeds of melons, tomatoes, and other such pulpy vegetables is a most interesting process. It is carried on in a little frame pavilion in a hollow in the southwest corner of the farm. The matter in hand, tomatoes, for instance, is first poured into a cider press and ground up, then placed into barrels and allowed to ferment for twenty-four hours. Upon this

Seed Cleaning.

the matter goes into a large washing tank furnished with a sieve through which the heavy seeds sink to the bottom, the light seeds and pulp floating off on top. The tank is then tapped at the bottom, the accumulated seeds drawn off, and after several additional washings they are ready to be dried.

Seeds are dried upon canvas frames in the second story of the buildings, where there is a free circulation of air, or, in fine weather, upon sheets and frames spread in the open air.

Among the Collies.

A highly interesting portion of "Fordhook" is the section devoted to live stock. The firm of Burpee has for years had a high reputation

as breeders of imported Collie dogs, and the kennels present a very important feature of the farm. The dogs are so beautifully kept, their quarters are so neat and clean, and the animals are so bright and intelligent that it is a pleasure to go among them. Mr. Burpee claims that he has here equally as fine stock as anybody in the country. He does not breed for exhibition purposes, and rarely exhibits any of the dogs, for fear of infection, but the end and aim of the breeding at "Fordhook" is intelligence and canine beauty, which are certainly here in the fullest degree.

The poultry houses and yards are equally as neat and clean as the kennels, and show untiring energy and attention. An incubator turns out dozens of fuzzy little thoroughbred chicks every month, and before they get old enough to breed they are placed in separate yards, each breed by itself, in order that strains may always be kept pure. There are about 700 chickens on the farm now, some of the breeds represented being Sherwoods, Black-breasted Red and Indian Games, Light Brahmas, Brown Leghorns, Barred Plymouth Rocks, White-crested Black Polish, Buff Cochins, and Langshans.

The fine strains of sheep and swine handled by the Burpee firm are kept at different points in Pennsylvania and New Jersey, the same care being maintained in their maintenance and the preservation of breed as with the dogs and poultry at "Fordhook."

Distributing Seeds.

The house of Burpee, whose large store and warehouses are in this city, 475 and 477 North Fifth Street, 476 and 478 York Avenue, occupies an unique position among seedsmen, inasmuch as they sell direct to planters more than any other house in the country. They come directly into contact with farmers and gardeners through the medium of their handsome annual catalogue, and their trade is all by mail and express, no agents being sent out through the country to stir up profanity and afford food for alert dogs. The catalogue is the best agent, and last year 575,000 copies of their catalogues went broadcast over the country, in addition to a great many million circulars.

Some idea of the immense business which is done at the Philadelphia warehouse in the handling of seeds is afforded by the statement that from 125 to 150 hands are employed, more than 4000 seed orders have been filled in a single day, and the enormous number of 6400 pieces of mail have been delivered at the store in one day, exclusive of newspapers and circulars.

The growing and distribution of seeds is apparently very much of a business.

From the NEW JERSEY TEMPERANCE GAZETTE, *Camden, N. J., April 2d.*

SEED GROWING AND TESTING.

MODERN DEVELOPMENTS OF THE BUSINESS AS ILLUSTRATED IN THE GROWTH OF A REPRESENTATIVE HOUSE.

SEED growing as a business is of comparatively recent origin. In the earlier years of our country's history each farmer grew his own seed, or else traded with his neighbors for their equivalent. This was neither satisfactory nor profitable, viewed from any standpoint, but was the best that could be done under the then existing circumstances. But as the calling of the agriculturist broadened and became more complex in its nature and demands, the necessity for better seed service became imperative. Farmers who had been content to raise ten bushels of wheat to the acre found that the extra cost of living and labor left no profit at the old yield. The changed circumstances demanded better seeds, better service, and bigger harvests.

Nowadays the farmer who raises his own seeds engages in a work which can be done far cheaper and better by the professional seed growers. Every man to his own trade. All the skill, industry, and energy which have characterized the seed growers have resulted in pushing the business to a point but little removed from perfection itself.

In the van of the big seed-growing concerns is the firm of W. Atlee Burpee & Co., of Philadelphia. There are other houses whose experimental farms are possibly as large as Fordhook, but it is nowhere written that the size of the farm indicates the quality of the seed. Fordhook is a synonym for painstaking care. There the seed is watched through all its stages of development, and at no point is it allowed to suffer for lack of careful attention. It is just this care that makes the Fordhook brand what it is.

Add to this vigilant oversight and rigid scrutiny the fact that W. Atlee Burpee & Co. are ever on the alert to bring out novelties of every description, and the key is found to the remarkable success of this firm. In the management of this house we find a happy union of wise conservatism, blended with virile progressiveness. But a novelty must have other merit than mere "newness" to win their approbation. Mr. Burpee knows that most of the readers of the 500,000 catalogues annually issued are not in business altogether for the "sake of their health." These readers are perfectly content to have the seedsmen experiment on the seeds at their own sweet pleasure, but they themselves don't want to be made the victims of the seedsmen's experimentation. The Burpee method is to experiment on the seeds, not on the customers. That is why their business has been built from nothing to its present enormous proportions.

From the DOYLESTOWN INTELLIGENCER, *September 30, 1895.*

FORDHOOK IN FALL.

A BRIEF SEPTEMBER VISIT AT THE SEED FARM—A GLANCE AT THE RECENT IMPROVEMENTS—BRILLIANT AUTUMN SETTING TO THE LABORS OF THE YEAR.

IN royal radiance beneath the golden September sunshine, is spread the harvest bloom at Fordhook. Never were the broad acres more beauteous than at this season, when the ripening process is in progress and the blossoms are most brilliant in their maturing. In full view from railroad trains, on either side of the lane, are extensive beds of scarlet sage, which flood the landscape with the soft, warm, cardinal light. Flanking these are beds of balsams, of paler hues, intermingled with the delicate green of their leaves, which constitute the setting of the more vivid center pieces. Seldom if ever have the seed grounds, sweeping gently to the south, presented more gorgeous pictures than this autumn, and never has Mr. Burpee's Fordhook Farm looked handsomer or given stronger token of the enterprise and activity, the accomplishments and success, of the industry and experiments carried on there.

In front of the house and extending to the railroad and highway are the seed-growing grounds first referred to. They are the most noticeable and best known features to visitors and travelers. Yet they do not so greatly merit or need description at this time, because of this knowledge. Extensive changes and improvements have been made in the recent past, and the institution shows large advance with each departing twelvemonth.

The trial grounds, east of the buildings and south of the woods, are packed to repletion with experiments in progress. In one place are numbers of sweet peas, away up in double figures. Another spot is marked by coxcombs. Here are tomatoes. Yonder are melons. Alongside are cauliflower. Beyond are a new variety of cabbage. Everything is labeled and marked. In the office are histories of each test. Everything is systemized. All work is intelligently done. The results of one season are available to conduct the operations of the next.

Sometimes experiments have to be repeated. All the needed information has not been acquired in the first operation. It is sometimes necessary to verify conclusions by repeated tests under differing conditions. But in each and every trial something is gained, and whatever it may be is recorded, that the information may be available in future.

In the recent past much work has been done about the buildings. In the old barn the basement has been completely renovated. Admirable stable arrangements have been introduced—hard pine fittings and cemented floors. Here are quartered the clean, slick, mild-eyed, and gentle Jerseys which supply Mr. Burpee's family and people with dairy products. Neighbors of the cows, across the entries, are the working horses. Especially noticeable among these are the two black Percherons, "Candid" and "Emmett," recently purchased up in York State. They are young fellows, but large, kind, intelligent, and very powerful. They are the admiration of all who visit Fordhook, and are admirably adapted for their duties of heavy farm work.

The dog kennels have been somewhat increased in number, and therein are found collies of all sizes, from a few days old—with grave and serious countenances—up to the patriarchs of marvelous understanding and intelligence, even for this most sagacious breed of man's best friend. The same general arrangement is observed as heretofore, and each kennel has a small run connected with it in which the occupant can take exercise. At the time of the writer's visit there were several litters of pups of the most cute and cunning appearance imaginable.

The chicken houses have been increased in number. They are commodious buildings with extensive yards connected with each. The species are, of course, kept separate, and many of the thoroughbreds are very handsome, while others, of much value, are not so pleasing to the eye.

West of the stock is a new and commodious building, now nearing completion, which is going to be a most useful as well as convenient adjunct in the seed-growing department. The structure is of frame so arranged, with inclined planes, that large loaded wagons may be driven directly through the center. On one side of this passageway a hoisting apparatus is arranged to carry freight to the third floor. On the west side, on the first floor, is a large, tight-floored, high-ceilinged room. This is to be used for a threshing floor. The process will be done with flails, and fanning will be by a hand machine as often and as finely as the different varieties of seed may demand. East of the

main gangway is a room for seed sorting and packing, with boxes and racks of drawers for storage. Adjoining the latter is a second room for the storage of certain kinds of implements, etc. The second floor contains drying racks—canvas cloth stretched across wooden frames. These are light, and may be stored in large numbers in limited space. The third floor is an open loft, where crops, such as beans, peas, corn, etc., may be spread for drying, or the space may be utilized for storage. From the third floor a narrow stairway leads to the observatory and belfry. From this point of observation all of Fordhook, except what lies along the Upper State Road, is visible. The view at this season is a splendid one, the luxuriant crops of vivid colors or ample fruitage, as the case may be, presenting all sorts of variety and diversity.

From the same point of vantage, extending for miles to the southeast and south, is to be seen the broad valley which sweeps away to Newville and westward in most handsome landscape of cultivated fields, farm buildings, woodland, etc. To the east is Doylestown, where the foliage and houses, the roofs and spires, the red of brick and green of trees, suggest town and country both, and handsomely mark the county's capital. Close below the belfry is the office building, wherein Messrs. Darlington and Earl, Mr. Burpee's chiefs of staff, are busily at work with their records and the direction of affairs. Just west of this is the cosy summer home of the proprietor, larger and more commodious than that destroyed by fire a few seasons back, where, with his family, Mr. Burpee spends the summer months, entertains his friends, and enjoys Fordhook, its beauties and environments, to the utmost.

From THE FLORISTS' EXCHANGE, *New York, January 28, 1893.*

W. ATLEE BURPEE & CO.'S SEED HOUSE.*

AS we have never given our readers a description of this immense establishment, we may be pardoned for going into a more lengthy description than we have allowed to the other seedsmen visited (in Philadelphia).

They claim to do the largest mailing business in the United States, and therefore, not improbably, in the whole world, and it is impossible to be in the building for a few minutes without receiving the impression that the business is immense, and that impression becomes conviction as each of the five floors and the basement of the building is visited in its turn and the increasing activity of the 140 people employed therein is noticed.

The first floor is partly devoted to the general office, in which is ample desk room for 30 people, book-keepers, cashiers, corresponding clerks, type-writers, etc. A feature of this office is an enormous safe, containing nothing but the order books for what is called the retail trade, that is, orders received by mail from private parties. On this floor is Mr. W. Atlee Burpee's private office, where the representative of the *Florists' Exchange* was received by the head of the firm, who after some most flattering encomiums of the paper, placed me under the guidance of the manager, to be shown over the establishment.

Leaving the office we proceeded to the rear, where a large open space is devoted to packing bulky goods, and which opens on York Avenue, where the wagons deliver all goods and load for shipment. A large steam elevator occupies one corner of this department. Following my cicerone, I now ascend to the first floor, on which is the flower-seed

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* The foregoing newspaper reports show the methods of growing and testing seeds at FORDHOOK FARM. The above article briefly describes the business system in force at our warehouse, Nos. 475 and 477 North Fifth Street, and 476 and 478 York Avenue. The same subject is more fully treated, and also carefully illustrated from flash-light photographs of the different departments, in pages 2, 3, 4, 5 and 6 in our FARM ANNUAL for 1894.—W. A. B. & Co.

department, where orders for these goods and for bulbs are filled. Pigeon holes and small drawers all around the walls and in large frames or cases, separated by narrow alleyways, make up the principal furniture on this floor and are filled with small packets of flower seeds, arranged so that every separate kind can be reached in a moment. A full line of empty packages or envelopes is kept here in pigeon holes corresponding with the filled packages.

Here also are large bins of sweet peas, for which Mr. Burpee, aware of their ever-growing popularity, has made contracts for over 14,000 pounds. Half of this floor is given up to the mailing department, the importance of which may be conceived from the fact that over 4000 orders are sometimes mailed from here in one day. This is exclusive of the goods sent out from the express department on the floor above, to which we ascend.

Here are the express, freight, and wholesale departments, and the seed-filling department, in which is a great curiosity in the form of an automatic package filler and closer worked by steam. The paper bags, of which all the small sizes can be used, are placed in a horizontal rack, along which they move in an erect position ; the seed is poured into a hopper at the top of the machine, which is then started. With wonderful rapidity a scoop receives a modicum of seed and pours it, by means of a long, narrow beak, into the bag which has come immediately beneath it. The bag filled, it travels on till it reaches a slot, into which it drops, receiving on its downward path a smear of mucilage on its flap and a squeeze to fasten it. It then drops into a receiver, where it is immediately followed by other bags which have been filled, gummed, and dropped into an endless stream. By this contrivance one operative can fill and gum 20,000 packages of seeds a day.

The next floor is used for bulk storage and printing. Four presses, a collection of electrotypes, and type are used to print bags, envelopes, names of retailers on catalogues, etc. The fifth floor contains the surplus stock of seeds, in packages, which is drawn on as required down stairs. Here, far above the constant movements and inevitable racket of the region below, is a large chamber with a long table, pierced at intervals with holes like those of letter boxes. It is here that the cashier, with sometimes as many as six assistants, presides at the opening of the daily mail, no trifling job, often comprising 7000 orders by letter or postal card. Each letter, as it is opened, is entered, and the money contained in it dropped into one of the holes intended for it, and made for cash, money orders, or postal notes, respectively. The orders, properly sorted out, then go to the different departments for filling.

I have not yet spoken of the enormous quantity of printed matter which is on every floor. No one knows better than Mr. Burpee the value of printers' ink, and his catalogues, of which there are five different kinds, are printed to the extent of 500,000 annually. The mailing of the new catalogues for 1893 commenced on December 4th last and will not be completed before the end of January. Besides this class of literature, the firm publishes another of equal interest to the general public. These books, well-written, printed, and bound in paper and cloth, are largely sold and also distributed as premiums to buyers. Their titles are to be found in the catalogue, which is certainly in the hands of every florist.

The department of Mr. Giles Leahy, that of advertising and printing, and to whom I am indebted for the above information, is not the least important one of this vast establishment.

I forgot to mention an important chamber I looked in at through a window, but could not enter, as only one man has a key. It is the repository of the most valuable stock seeds.

Descending this time as low as the vast cellar used for potatoes and other bulky stock, I reascended to the office, where Mr. Burpee gave me much further valuable information.

The firm has a large storehouse for seeds on Third Street, and a model seed farm at Fordhook, in Bucks County, which will be, we hope, visited and made the subject of a special article at an early date, and where Messrs. Burpee & Co. raise also fine live stock.

I left this hive of industry deeply impressed with its size, the vast extent of territory it supplies, not only in the United States but in Europe, even Russia sending large orders, and, above all, with the wonderful system in force, by which the head of the firm controls from his office every department, each of which has its separate manager, and by which every order can be traced at any distance of time from its receipt in the office to its delivery to the buyer.

The arrangements for testing the seeds, whose quality has made the reputation of the firm, belong to Fordhook, and will be described when that interesting place is visited.

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☞ It will be noticed that *these premiums are entirely* FREE, and *do not prevent* the selection of $1.25 WORTH *of seeds in packets* for EACH $1.00 sent us for seeds *in packets*. If the purchaser's order is all for seeds by weight or measure, on which we do not allow this discount, he is still entitled to the selection of any of our books.

A YEAR'S WORK AT FORDHOOK FARM.

With Fifty Beautiful Half-Tone Illustrations.

In this new book, just published, the pen and the camera transport its reader to "Fordhook," the Model Seed Farm of America—in so far as such a thing is possible—by affording him a comprehensive view of it as it actually appears. Although the price is 10 cents, we will, upon the receipt of **two 2-cent stamps**, mail a copy to any planter who desires to read this book **before sending** this season's order for seeds. Shall we mail you a copy now?

In addition to the many charming views of "Fordhook," it contains photographic illustrations of a unique Floral Wonder to appear in 1896,—something absolutely without parallel in the annals of horticulture. One dollar per seed would not buy a packet now; but we believe flower lovers the world over will be glad to learn, a year in advance, of the coming of the greatest novelty that has yet rewarded the scientific cultivation of flowers. 'Twill produce a profound sensation in '96, and it were wise for you to write to-day.

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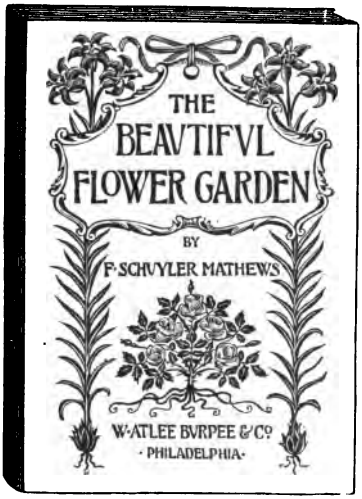

A book on artistic gardening, by a trained artist and enthusiastic amateur gardener. The pages overflow with pen-and-ink sketches from nature, while the subject matter is drawn from the best in the artistic world of gardening, showing the influence of the formal English style, the Italian renaissance, and the art of the Japanese upon gardening.

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The author has for more than thirty-five years been one of the leading Potato growers of the country and is the originator of some of our best varieties, including BURPEE'S EXTRA EARLY and THE GREAT DIVIDE. He has given to his readers the results of his long experience as a successful Potato grower in a most readable and helpful book.

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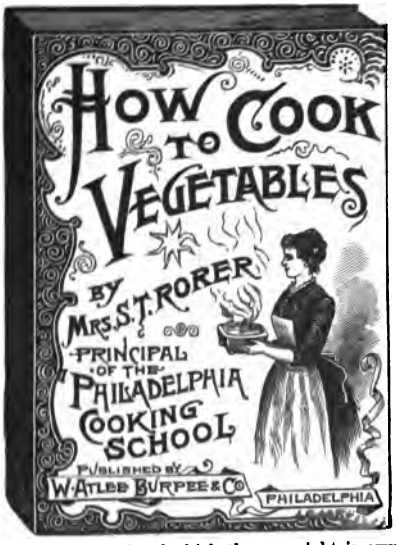

It is a book of 182 pages of the same size as *The Kitchen Garden*, and gives numerous recipes for cooking all varieties of vegetables in every style—many of which will be new even to the most experienced housewives. As an illustration of how thoroughly the subject is treated, we would mention that it gives forty ways of cooking potatoes, twenty-six of tomatoes, and twenty-two of corn. It also gives twenty-eight recipes for making SOUPS and thirty-seven recipes for SALADS. Besides "HOW TO COOK VEGETABLES," it also tells numerous ways HOW TO PICKLE,—HOW TO PRESERVE FRUITS,—HOW TO CAN FOR WINTER USE, as well as how to serve vegetables cold.

An important supplement to the general scope of this treatise is the addition, also by Mrs. Rorer, of nearly fifty complete MENUS, for spring, summer, autumn, and winter. In all, it is a most complete book, that will prove really valuable to every progressive housewife.

This new book, of which the copyright is owned by us, is not for sale, and can only be had as a Premium by those who purchase Seeds, Bulbs, or Plants from us. In order to place it within the reach of all we offer the paper-cover edition entirely FREE as a Premium on an order amounting to $3.00. A copy substantially bound in cloth, for kitchen use, can be had free with an order for $5.00.

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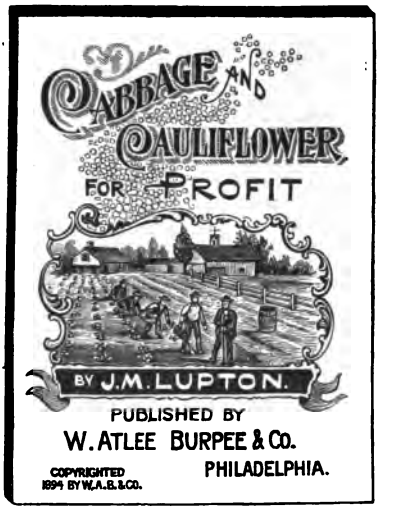

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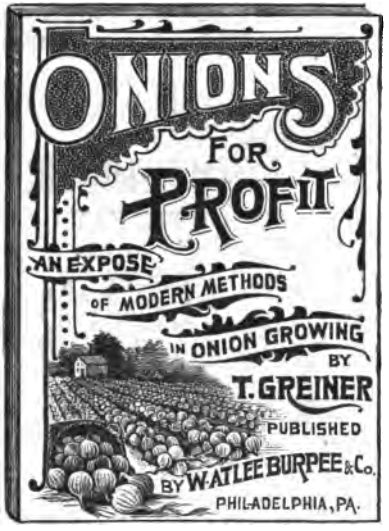

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in Onions: $500, and even more, per acre, if you know how to get it out. This money is for the "up-to-the-times" market gardener, the progressive farmer, and the bright farmer's boy everywhere. No more practical and successful Onion grower than Mr. Greiner can be found, and he gives his latest knowledge in ONIONS FOR PROFIT without reserve. The book will undoubtedly mark an epoch in works on this subject.

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PART FIRST treats of the Location and Management of the Home Garden, Soils, Drainage, Manuring, Composting, Concentrated Manures, Hot-beds and Cold Frames, Selection of Seed, Preparation and Planting, Climate, Geographic Distribution of Plants and Animals, and briefly describes the Seven Life Zones of North America.

PART SECOND gives the Distribution of Aboriginal Species, contains accurate and complete Cultural Directions for all Culinary Vegetables described in **Burpee's Farm Annual,** with Notes on Varieties and Time Required from Planting until Vegetables are Ready for Use, or to Maturity.

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The book has been compiled from our own publications, the trial records of Fordhook Farm, and a very comprehensive manuscript work on general gardening, owned by us, but which has not been published,—for which we paid **five hundred dollars.** Our long experience has made clear the need of just such a work, and we advise everyone,—both amateur and professional gardeners,—to secure a copy.

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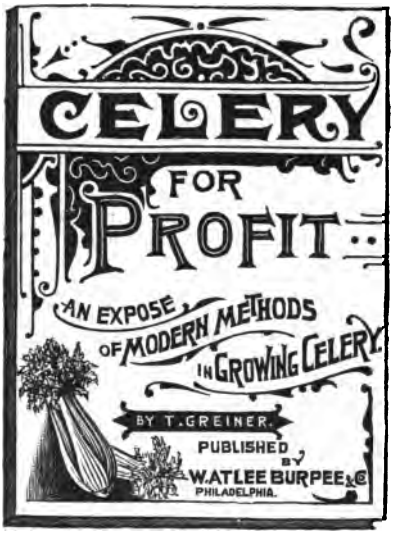

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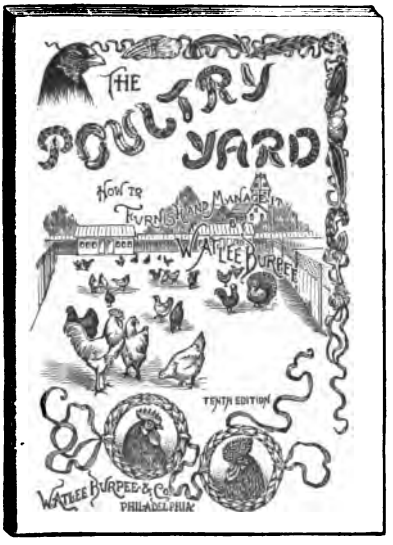

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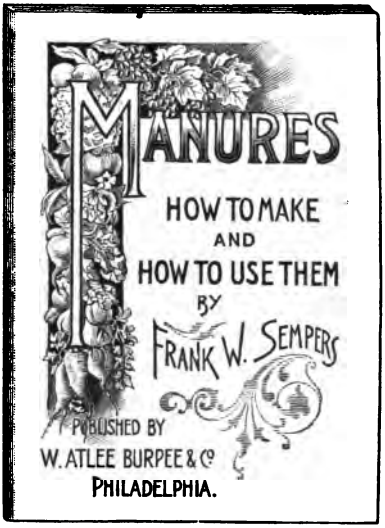

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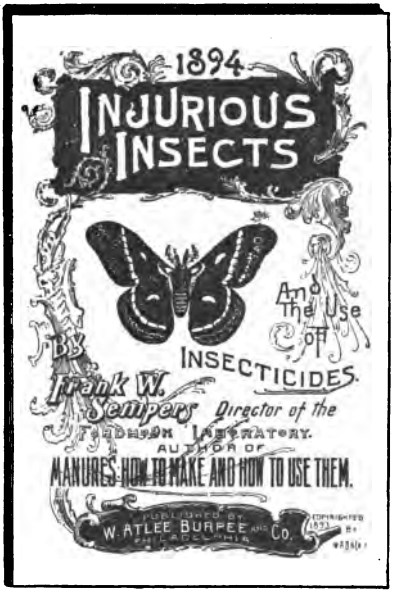

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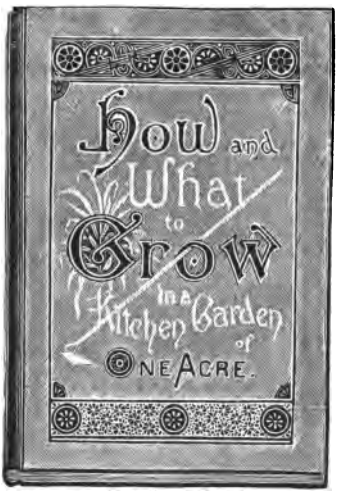

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